

# Development of YLL due to suicide in young people in Norway

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# **Development of YLL due to suicide in young people in Norway**

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# Abstract

Although suicide in Norway has shown a declining trend since the late eighties this may not reflect all age groups in the society. When it comes to the younger population this downward trend is less clear, suggesting suicide in the young as a proportionally bigger issue today than years prior.

Recent years have brought forth studies from abroad in which the Years of Life Lost perspective (YLL) has been applied as a proxy to measure the social burden caused by premature death. Opposite to the more conventional age-standardized suicide rate one could argue that the years of life lost approach takes into account a societal perspective where impact of death differs at various stages in life. As far as we know this perspective has not been applied in suicide research concerning the Norwegian population. We therefore find it of importance to measure social loss, in terms of years of life lost, induced by suicide in the young.

Mortality data of suicide was collected from online publication on mortality provided by the Norwegian Bureau of Statistics for the period from 1970 through 2011. YLL was calculated in accordance with framework provided by the World Health Organization (WHO). Data were stratified by age and gender with particular focus on age bands of 10-19 and 20-29 years old. In order to capture the relative contribution in YLL due to suicide in the young, comparisons were made in relation to suicide in all age population and to overall cause of death.

In accordance with prior studies regarding suicide rates in Norway, we found an increase in YLL from the early seventies to late eighties. Later years showed a general decline in the total suicide YLL, with a more stabilized trend in the most recent years. Men held the bigger share of YLL than what was found in women. Age group 20-29 years old, both genders, contributed to more years of life lost than seen amongst the 10-19 years old. The only group with a relatively consistent increase throughout the whole time-period was that of women 10-19 years old. While YLL due to overall cause amongst the young was subjected to a decline throughout the whole time period, this was not the case with suicide. This suggests an increase of the relative significance of suicide in the young when looking from a societal perspective, and thus calls upon further efforts to prevent suicide in the young.

# Sammendrag

Tross en generell nedgang i selvmord i Norge siden slutten av åttitallet speiler ikke dette nødvendigvis alle aldersgrupper i befolkningen. Blant unge i Norge er de senere års nedadgående trend mindre tydelig. Det kan se ut som om selvmord blant unge er et proporsjonelt større samfunnsproblem i dag enn for noen tiår tilbake.

Senere tids forskning har introdusert Years of Life Lost (YLL) som en proxy for å måle de samfunnsmessige konsekvensene av prematur død. I motsetning til den mer tradisjonell dødsraten måles ikke dødelighet i antall individer, men i antall år regnet tapt som følge av at en person dør i tidlig alder. YLL som metode kan slik hevdes å fremheve de samfunnsmessige konsekvensene av tidlig død. Når vi ikke kan se at dette perspektivet er benyttet innen studier her i Norge mener vi det er av betydning å se nærmere på utviklingen av YLL som følge av selvmord blant unge.

Døds-data for selvmord ble hentet fra det norske dødsårsaksregisteret i perioden 1970 til 2011. YLL ble regnet ut i samsvar med rammeverket tidligere benyttet av Verdens Helseorganisasjon (WHO). Data ble stratifisert for alder og kjønn, med særlig fokus på aldersgruppene 10-19 og 20-29 år. For å måle den relative størrelsen av YLL som selvmord blant unge har bidratt til, har vi gjort sammenlikning med selvmord i alle aldersgrupper og som følge av alle dødsårsaker.

I samsvar med tidligere studier vedrørende selvmordsrate i Norge fant vi en markant økning i YLL fra tidlig syttitall til sent åttitall. Senere år viste en generell nedgang, med en mer stabil trend de siste årene. Menn stod for en større del av antall år tapt enn det vi fant hos kvinner. Aldersgruppe 20-29 år, begge kjønn, stod for større del av antall år mistet enn det vi fant blant aldersgruppe 10-19 år. Kvinner 10-19 år pekte seg ut som eneste gruppe med relativt jevn vekst hele tidsperioden. Våre funn indikerer at mens YLL som følge av alle dødsårsaker minsket i tidsperioden 1970-2011, var ikke dette tilfelle med selvmord. Dette vil medføre at selvmord blant unge i aktuell tidsperiode har blitt et proporsjonelt større samfunnsproblem, hvilket fordrer ytterligere tiltak for å forebygge selvmord blant unge.

# Preface

It may seem like a strange task estimating the burden associated with suicide. In the process of looking at premature death from a cost efficient perspective, our understanding of human worth may run the risk of being confined to that of resources and potential output only. My initial reaction when introduced to the concept of years of life lost was that this could, and should not be the main reasoning behind public prevention programs and clinical intervention. Seeing that my own background is from child protective services I do find it difficult to assign value, in terms of human capital, to children and adolescents in dire need of help. Safe to say the true worth of a human being extends beyond what it may “offer to the table.”

By this note one could ask why measuring such burden at all. Should not our belief that each human is worth fighting for be deemed sufficient cause for future efforts? The simple answer is yes. From a personal perspective this is the reason why resources are located to help and empower individuals and groups in the society which by various reasons find themselves in a place where they are not fit to face the problems at hand alone. However, public policy is not only based on what is deemed right from an ethical standpoint. The “whether or not” to prioritize limited resources is also based on potential gains in the future. By that account it is tempting to say we are trapped in a limbo, navigating between our basic wish to do good, and at the same time striving to meet the increasing demands for cost efficiency in the public health sector.

In his book *The Sociological Imagination* by Mills (1959/2000), the relationship between the situation where man finds himself, and the state of society, is discussed. Although it is pointed out that one cannot understand either while excluding the other, it is implied that we need to distinguish between “personal troubles” and “public issues (p.8). It is this notion of different stories that brings us to the years of life lost perspective (YLL). Serving as a proxy for the burden induced by premature death, this method offers an alternative to the traditional death-rate, paying greater heed to the societal consequences of suicide in the young. We are, and must be, aware that this perspective does not answer for the bigger picture. Still, bearing in mind the increasing demands for cost efficiency, one could argue that the YLL alternative may advocate the issue of suicide prevention where policy makers are concerned. This need for advocacy is illustrated in a recent interview by Norwegian broadcast, NRK Rogaland. Here, researcher Lars Mehlum addresses suicide in the young as an important issue in

Norway today, and calls upon political willpower to prioritize much needed measures as described in the national prevention program (Topdahl, 2014).

In the process of writing this thesis I have often contemplated the irony of being at “the other side of the table.” This meaning that I am not altogether used to look at suicide prevention from a cost efficient perspective. I have found my own beliefs being put on the test. Though I must say that I am still inclined to lean to the personal perspective, it has been a most interesting process where my understanding of personal tragedy and public issues, and consequently the relationship between these two, has been expanding.

At last I would like to express my gratitude to my supervisor, Prof. Dr. med. Ping Qin at Nasjonalt senter for selvmordsforskning og –forebygging (NSSF), for her invaluable guidance and support. This study would not be possible without her enthusiastic help. My sincere thanks also goes to Bente Ulleland for pointing out all those twisted sentences. I would like to thank my family; mum, dad, Guro, Mia and Panchin. Most of all a very warm thank you goes to Almita for keeping things in perspective.



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# 1 INTRODUCTION

## 1.1 Objective

We wanted to measure the burden to society due to suicide amongst the young in Norway, using Years of Life Lost (YLL) as measurement. Data were obtained from the website of Statistics Norway (SSB), concerning registered deaths from suicide, and overall cause during the time period 1970-2011. Two different age groups were set, 10-19 years, and 20-29 years old, as particular focuses. Using Microsoft Excel, we multiplied number of deaths with standard life expectancy at age of death and adjusted for discount factors, as presented in the Disability Adjusted Life Years index (DALY). In order to capture the relative contribution in YLL due to suicide in the young, comparisons were made in relation to suicide in all age population and to overall cause of death.

## 1.2 Background

Although suicide rates in Norway have been declining since the late eighties this may not reflect all groups in the society. When it comes to the younger population this downward trend is less clear compared to the overall picture. More so, there seems to be an increase in suicide rate amongst young women (Titelman et al., 2013). In this context we find it important to measure the burden of such loss. Later years have brought forth studies from abroad in which the years of life lost perspective has been applied (Law, Yip, & Chen, 2011; Savidan, Junker, Cerny, & Ess, 2010; Yip, Liu, & Law, 2008). To our best knowledge research such as this has been of limited extent in Norway. Recent studies, however, imply that measuring years of life lost shows a broader picture of the magnitude of said cause of death (Doessel, Williams, & Whiteford, 2009a, 2009b; Gunnell & Middleton, 2003). Opposite to the more conventional age-standardized suicide rate one could argue that the years of life lost approach takes into account a societal perspective where impact of death differs at various stages in life (Dempsey, 1947).

### 1.2.1 Historical context of the year of life lost perspective

The monitoring of health status and the quantifying of mortality in the population has long since been recognized as important tools in devising guidelines for public health policy.

Concerning suicide deaths, estimated country specific data (both absolute numbers and suicide rates) are included in the WHO mortality database (Bertolote & Fleischmann, 2009). Later years has brought forth measures to better assess the impact of premature death in the population. It is in this context we find the year of life lost perspective. The concept was first introduced in the late forties, known as Potential Years of Life Lost (PYLL or YPLL). Its recognized originator, Mary Dempsey, sought to compare mortality due to tuberculosis, with cancer and heart disease (Dempsey, 1947; Doessel et al., 2009a; Romeder & McWhinnie, 1977). Pointing out limitations depending solely on death rates (headcount) in measuring the seriousness with said disease, she argued that deaths amongst the young carries more weight than other age groups in a given population. As an alternative way of measurement, the PYLL was introduced, thus shifting focus onto the social and economic consequences of mortality. The PYLL alternative may be seen as a proxy measure of the social impact of premature death.

Though the original method calculated each death with the years of life remaining in accordance with current life expectancy, it should be noted that the PYLL approach has been exposed to a variety of different interpretations, mostly concerning the actual weighting of years lost (Gardner & Sanborn, 1990). As a result of this, later studies have introduced a number of different methods of calculating PYLL (Greville, 1948; Logan & Benjamin, 1953; Marlow, 1995; Romeder & McWhinnie, 1977; Stickle, 1965). Here, we will not go into further details on the variety of PYLL-calculations. For more information on this subject we refer to the publications mentioned above. We will, however, impress awareness of the groundwork in seemingly identical methods. Where our study is concerned, it makes use of the design inherent in the Disability Adjusted Life Years index (DALY) as presented in the Global Burden of Disease study (GBD) (1990). Hence, we refer to the term Years of Life Lost (YLL), the mortality component of the DALY index. Next we will give a brief explanation for the key components of the DALY.

### **1.2.2 Disability Adjusted Life Years (DALY)**

The DALY index is a summary metric of population health, which aims to bridge the gap between the *actual* and the *ideal* situation concerning public health. An ideal situation here refers to a society where all citizens live their lives in perfect health and not a single person fails to live up to age of standard life expectancy. In short, the DALYs in a certain population

are equal to this gap, consisting of all the lost years due to premature deaths and disability. By this account the DALY consists of Years of Life Lost (YLL) and Years Lived with Disease (YLD). Relating to the original Potential Years of Life Lost (PYLL) (Dempsey, 1947), one could argue that the DALY extends upon the concept of PYLL, including equivalent years of life lost due to poor health or disability. In what follows we will account for some key aspects regarding the calculation of DALYs. For further details we refer to the publications stated below (Mathers et al., 2006; C. J. Murray, 1996; C. J. Murray & Acharya, 1997; C. J. Murray et al., 2012; C. J. Murray & Lopez, 1994; Salomon et al., 2012; World Health Organization, 2001b, 2001c).

## **Life Tables**

In order to calculate DALYs, a standard lifespan is required in which to tell how long we should expect people in good health to live. The DALY makes use of life-tables delivered by the World Health Organization (WHO). These tables consist of detailed information based on region- and country-specific data, as well as making distinctions between upper and lower bounds concerning world-bank income group. According to present tables, life expectancy at birth male/female was 79 and 83 years in Norway for the year 2011. Though life-tables used in the DALY derive from expected life years in the Japanese population, these are fairly comparable. On the basis of these numbers we will then say that our ideal state of health in a Norwegian population is that every single person lives up to life-expectancy without being sick, disabled or injured in any way.

## **Disability Weighting**

Secondly comes the matter of quantifying time lived with disability. The DALY measures the incidence of disabilities and then average duration of each given disability. In addition to incidence and duration we also need to know the severity of the disability, ranging from 0 (perfect health) to 1 (death). This means that our use of the term disability refers not only to severe or near terminal stages, but also any state in the important domains of health characterized as less than ideal. More specific, these domains, as listed by the WHO International Classification of Functioning, Disability and Health (ICF), consists of mobility, self-care, participation in usual activities, pain and discomfort, anxiety and depression, and cognitive impairment. We find that this approach has been used in studies concerning burden

of disease, though with additional domains such as handicap, mental well-being, vision, sleep and energy (Stouthard, Essink-Bot, & Bonsel, 2000). Initially in the GBD-project, estimates of severity related to various health states were made by asking a small group of medical and public health experts. In later years, estimates derive from large representative population samples in over 70 countries (Salomon et al., 2012). Obviously, in the case of suicide the disability weighting will always equal 1 (death). For our purpose, we will therefore let the YLD be, and move forward on the basis of YLL - the mortality component of the DALY. Nonetheless, several studies do make comparisons between different kinds of diseases and injury deaths, including suicide (Doessel, Williams, & Whiteford, 2010; Genova-Maleras, Catala-Lopez, Larrea-Baz, Alvarez-Martin, & Morant-Ginestar, 2011; Jankovic et al., 2007; Schopper et al., 2000; Vlajinac et al., 2008; Yip, Law, & Law, 2003).

### **Social value choices**

A key component in a number of DALY studies is the social value choices. The DALY implies that a year of healthy life is weighted different throughout a lifespan, so that lost years amongst the very young and the elderly are regarded less, at least from a social point of view. As a consequence, the DALY applied a continuous 3% discount rate for each future lost year along with non-uniform age-weights in the Global Burden of Disease study of 1990. It should be noted that the application of value choices has varied in later GBD studies. For the GBD 2001, non-uniform age-weights were discarded, while discount of future years were kept. For the 2004 update both value choices were applied. In the latest study, GBD 2010, neither age-weights, nor discounting were inherent in the calculations. Obviously, the social value choices have an impact on the results when calculating years of life lost. This will further be addressed in the method section.

To clarify, our study refers to the term Years of Life Lost (YLL). This is the method we have chosen to measure the burden due to suicide deaths in the young. Our study is in accordance with the framework provided for the GBD study of 1990 and the 2004 update, social value choices inherent. As mentioned earlier, readers should be aware that the years of life lost perspective offer a variety of methods in measuring social burden due to premature death. The PYLL measure is perhaps the more known of these. Although the YLL measure may be seen as a continuation of the original work by Dempsey (1947), we need to stress that they are not

the same in all aspects. In our following review of existing literature regarding our topic, we beg readers to bear in mind this distinction.

### **1.2.3 Literature review**

The following databases have been put to use: Embase (Ovid), Medline (Ovid), Global Health (Ovid), Psycinfo (Ovid), Psycharticles (APA), Scopus (Elsevier), Pubmed, Pubpsych, Swemed, & Idunn. Words and phrases typically used: years of life lost, burden of disease, disability weighted life years, suicide, self-inflicted injuries, injury, self-harm, overall cause. First we looked into publications from the Global burden of Disease project (GBD), as conducted by the World Health Organization (WHO). We then did a search for publications regarding years of life lost due to suicide and self-inflicted injuries. Limiting our search to abstracts only, we ended up with 184 hits distributed between the databases as mentioned, with the exception of Swemed and Idunn. This number of hits may be misleading come to describe the scope of the topic at hand. A considerable overlap between databases should therefore be pointed out. To our best knowledge, studies considering years of life lost and burden to society induced by suicide are limited in Norway and the other Scandinavian countries.

Reading through each abstract and subject heading, we made a set of criteria in order to decide whether or not to discard or keep publications for further investigation. Firstly, we were looking for descriptive epidemiology where the main point of the story was relating to burden of disease, accident or injury. Articles reevaluating different kinds of measurement, or debating the ethical aspects of a cost efficient perspective in health and social politics were included here. Secondly, we sorted out those publications in which the years of life lost perspective, and consequently the disability weighted life years (DALY) were prominent. We then sought to find those publications where suicide, self-harm, self-inflicted injuries and injury were one of the main topics.

As far as we know, we did not discriminate amongst different publishers, or the institutions in charge of research relating to our topic. It should be noted that the more substantial works on social loss due to premature death are those conducted by the World Health Organization and their Global burden of Disease project, in which a majority of studies have recently been published in the medical journal *The Lancet*. As far as suicide is concerned, clearly this is a minor subject in the Global Burden of Disease studies, which gives answer to the lack of use

of studies such as these. More recent publications were prioritized, though it must be said that burden of disease studies are relatively new. Concerning the method of PYLL, it goes back to the late forties (Dempsey, 1947), but for our part, relevant publications with the year of life lost perspective dates back to the late eighties (Langley & McLoughlin, 1989). As for language, publications in English, Norwegian, Swedish, Danish or German were preferred. Some publications were discarded in the initial steps, falling short of these criteria (Bernal, Gomez, Gutierrez, Lafita, & Guillen, 1995; Sorimachi, 2004), though we are fairly certain this does not pose any serious limitations where our study is concerned.

Narrowing down the number of publications we ended up with approximately 50. Consisting mostly of descriptive epidemiology, we found that the various publications differed somewhat regarding their main issue. A number of publications emphasized the importance of government action in what was interpreted as neglected areas in policy regarding issues such as injuries, accidents or suicide (Ajetunmobi, Taylor, Stockton, & Wood, 2013; Bose et al., 2006; Cryer, Davidson, Styles, & Langley, 1996; Doessel et al., 2010; Jankovic et al., 2007; Langley & McLoughlin, 1989; Law et al., 2011; Lukaschek, Erazo, Baumert, & Ladwig, 2012; Plass et al., 2013; Rockett & Smith, 1989a; Vlajinac et al., 2008; Wang et al., 2008; Yip et al., 2003; Yip et al., 2008; Yip, Liu, Law, & Law, 2005). Several studies compared years of life lost in different age groups, genders and other socioeconomic characteristics in the population. In addition to this they also compared different nationalities (Law et al., 2011; Rockett & Smith, 1989a; Yip, 1996; Yip et al., 2003). Still, comparison between different causes of death was the most recurrent issue in the majority of the studies we examined.

A smaller part addressed suicide as one of the main topics, and still fewer solely concerned themselves with suicide alone or in comparison with other diseases/injuries. (Bose et al., 2006; Crosby, Espitia-Hardeman, Hill, Ortega, & Clavel-Arcas, 2009; Darragh, 1991; Doessel, Williams, & Robertson, 2011; Doessel et al., 2009a, 2009b; Law et al., 2011; Lukaschek et al., 2012; Rockett & Smith, 1989a; Yip, 1996; Yip et al., 2003; Yip et al., 2008; Yip et al., 2005). Regarding our main issue; social loss due to suicide in the young, we found that studies seldom had focus on age-specific groups. However, a number highlighted the issue of death by suicide amongst young and middle-aged people (Darragh, 1991; Doessel et al., 2011; Lukaschek et al., 2012; Yip et al., 2008; Yip et al., 2005). As for social loss, we found this was one of the main concerns in four studies relating to suicide (Law et al., 2011; Yip et al., 2003; Yip et al., 2008; Yip et al., 2005).



Several publications debated or advocated the means for measuring suicide, more specific the traditional headcount vs. YLL or PYLL (Aragon, Lichtensztajn, Katcher, Reiter, & Katz, 2008; Doessel et al., 2011; Doessel et al., 2009a, 2009b; Schopper et al., 2000). It was argued that these two generate different pictures of suicide. Although the mortality-rate as measurement was not rejected, most studies were in favor of years of life lost coming to evaluate public health prevention strategies. In this selection of literature we failed to find any extensive critique of the YLL or PYLL as a method for suicide-measurement. This may be due to the fact that this particularly branch in suicidology is quite new, furthermore that suicide fits a relatively small box in the catalogue of burden of disease studies. We've therefore looked into other voices and attitudes towards the cost-efficient approach in public health, in general (Anand & Hanson, 1997, 1998; Arnesen & Nord, 1999; Nord, 2013).

## **Main findings**

The majority of the publications in this short review showed that suicide, self-inflicted injuries, injuries and mental health related mortality contributed to a large share of years of life lost. Use of these different terms may be misleading. Self –inflicted injuries, injuries and mental health related mortality included, to some extent, death by suicide (Bose et al., 2006; Cryer et al., 1996; Doessel et al., 2010; Rockett & Smith, 1989a; Vlajinac et al., 2008). It was found that downward trends in all cause of mortality may not reflect that of suicides. In this regard, the years of life lost perspective, more so than the conventional approach, seemed to stress the magnitude of premature death due to suicide when compared to other causes (Doessel et al., 2009b).

An increase in YLL or PYLL was reported in a number of studies, especially in the young and middle aged (Cryer et al., 1996; Darragh, 1991; Law et al., 2011; Yip, 1996). Decline was rarely reported, with the exception of the population of Beijing and Taiwan in the time period 1981(87 Beijing)-1994 (Yip, 1996). It was implied that the rising trends in years of life lost due to suicide should be explained by either an increase in suicide rate, increase in suicide rate amongst young people, or a combination of these two (Yip, 1996). Also of interest here was the assumption that though it may seem like suicide rates increases with age, suicide as a proportion of all causes of death is higher in younger age groups (Lukaschek et al., 2012). Men seem to be the predominant source of lost years due to suicide, with the exception from a study concerning Chinese population, time period 1990-2000. Rural women, age 25-29 had

here the larger share of PYLL (Yip et al., 2008). Another study from South-India showed that although suicide in men were more common, the proportion of years of life lost due to suicide was greater in women when compared to other injuries (Bose et al., 2006).

The years of life lost perspective was largely considered to give greater weight to premature mortality, offering a new viewpoint for setting up public health policies (Doessel et al., 2009b, 2010; Vlajinac et al., 2008; Yip et al., 2008; Yip et al., 2005). Suicide came out as a top priority whether one used YLL or PYLL as measurement (Schopper et al., 2000). Several studies suggested implications for policy. Improved health strategies targeting high risk groups, regional priorities, access to intervention and suicide prevention were mentioned. It was further implied that the burden to society induced by suicide were overlooked, along with a knowledge gap in the health-sector considering mental health related mortality (Cryer et al., 1996; Doessel et al., 2010; Yip et al., 2003; Yip et al., 2008; Yip et al., 2005).

### **Limitations of literature**

Moving forward on the basis of the publications as mentioned, poses several possible challenges. Firstly we found that relevant publications on our subject are somewhat scarce when compared to other branches of descriptive epidemiology. As mentioned earlier this is reflected in the lack of publications considering suicide in Burden of Disease studies. Of those publications that were available and did fit our need, 16 different publishers were represented, mostly in the line of public health. Suicide was the main issue in two; *Crisis*, and *Archives of Suicide Research*, providing five studies on the topic of years of life lost. As for country- and regional specific data, studies were conducted from 14 different sites. Studies on eastern Asian population included Hong Kong, China and Taiwan. One study concerned a population in South-India. Australia was represented, along with New Zealand. Two publications were based on data from American populations. Studies from the European continent included United Kingdom (Northern Ireland), Spain, Germany, and Switzerland. There were no studies on populations in the Scandinavian countries included here. Publications dated back as far as late eighties, though the majority of studies included time-series data reaching up until the early 2000s or later.

On this basis we should be aware that publications may differ in their main subject, and may influence conclusions made. However, we feel confident that the general focus on public health and subsequent implications for policy fits the purpose of our study. When it comes to

country- and regional specific data we should be careful not to draw assumptions on a regular basis. First off, the studies in our review include populations with vast differences regarding demographic composition, economic and societal conditions, religious tradition and cultural heritage. Report system, labeling and registration of suicide, in which both the traditional suicide rate, and years of life lost measurement relies on may also differ. Although variation in demographic composition varies on site, comparison between populations is possible converting numbers into a PYLL rate (number of suicide PYLL per 100,000 population) (Romed & McWhinnie, 1977). Be that as it may, the studies in our review do not necessarily do this. On the subject of comparison one should also be aware that different ways of weighting will very likely influence results (Gardner & Sanborn, 1990). In studies making use of the YLL, this issue is somewhat diminished. For our purpose we will be content that said publications provide information about the burden of premature death due to suicide in a given population.

## **Conclusion of literature**

This section has concerned itself with available literature on premature death due to suicide, in a “years of life lost” perspective. We find that the YLL alternative offers much needed information on the magnitude of social loss that untimely deaths account for. When suicide fails to reflect the overall downward trend in mortality we argue that further information still is needed. As of yet there are no substantial works on this issue here in Norway. We therefore find it of importance to measure social loss, in terms of life years, induced by suicide in the young. Next we will account for choice of design in the method section, along with possible limitations and ethical issues.

## 2 METHOD

### 2.1 Mortality data and calculation

Mortality data for suicide and overall cause was collected from the mortality database provided by the Norwegian Bureau of Statistics, time period 1970-2011. Deaths were tabulated by five year age groups, separating infant deaths; 0,1-4, 5-9, 10-14,...80-84, 85+. Standard life expectancies for average ages of deaths was calculated for each age-sex group by interpolating exact ages of death, given in the full Model West standard life tables by single year of age. Then, if  $N$ =number of deaths (for said interval) and  $L$ =standard life expectancy (interpolated), the basic formula would be:  $YLL = N * L$ .

Using Microsoft Excel, YLL was calculated multiplying number of deaths for each specific age with interpolated life expectancy for said age-band. A continuous discount rate on 3% was set, and non-uniform age weights were used in accordance with the Global Burden of Disease 1990 and the 2004 update. For full formula, non-zero discounting and age weighting included, we refer to Murray & Lopez (1996) and WHO (2001a).

Time series data were tabulated in two year-bands; 1970-71, 72-73... 2010-11. The amount of YLL for each two year period combined was divided by two, presenting an average for said time band. This decision was based on the wish to avoid unnecessary fluctuations. YLL due to suicide was calculated, presenting a total for given two year period. Data were stratified by gender. Two separate age groups were set, age band 10-19 and 20-29 years. In order to capture the relative contribution in YLL due to suicide in the young, comparisons were made in relation to suicide in all age population and to overall cause of death. Absolute numbers were calculated. In addition relative numbers (e.g. proportion) were presented to better get a picture of the relative significance of suicide deaths in young people.

In what follows we will address some ethical issues in choice of design and potential shortcomings in data sample used. First a brief account of the social value choices inherent in the formula used in our calculations.

## 2.2 Social value choices

### 2.2.1 Discounting future years

As mentioned future years of life lost were subjected to a continuous discount rate of 3%. What this implies is that a year of life in the present is regarded more valuable than a year gained somewhere in the future. Picturing a ten year window, the value of each future year will decrease 3% in value from the year prior, reaching a total of 24% decrease in said time window. Clearly such altering of value associated to life years will influence results. The following answers to why discounting has been applied in a number of studies. First off, appliance of a discount rate is more consistent with the cost-efficiency perspective, and bears resemblance to the discounting of future benefits used in economic analysis. Secondly, by the means of discounting one hinders excessive weight be given to deaths amongst the very young. Lack of such praxis is believed, by some, to give a disproportional picture of the burden of disease. It should be pointed out that these concerns was not introduced with the GBD – project in 1990, but has been subject for debate since the original publication by Dempsey (1947), offering different voices on the issue of death amongst the very young (Gardner & Sanborn, 1990; Greville, 1948; Logan & Benjamin, 1953; Marlow, 1995). The disease eradication/research paradox is known to be the more solid argument for discounting (C. J. Murray & Acharya, 1997; World Health Organization, 2001b). Basically this paradox depicts a scenario where there is a non-zero chance of complete eradication of a known disease somewhere in the future. From a cost-efficient perspective policy makers would then be inclined to prioritize resources solely into research, on the argument that the future stream of benefits is infinite. However, postponing all current interventions on the basis of a future payoff would likely cause an excessive sacrifice on behalf of the current generations. To solve this problem, appliance of a discount rate has been argued. As for the choice of 3% this is somewhat arbitrary. Although lower than what may be preferred by economists focusing on cost efficiency, the 3 % may be seen as the upper limit for those whose acceptance of such an appliance rests on the argument of said excessive sacrifice (Mathers et al., 2006; C. J. Murray & Acharya, 1997). Where our study is concerned we should be aware that the “whether or not” to use discount rating does not offer any easy answer. Bearing in mind this is a much debated issue today we do however feel confident that our approach is in line with previously burden of disease studies.

## 2.2.2 Age weighting

Age weighting assigns different value to time lived at different ages. Applied by the Global Burden of Disease Study 1990 and the 2004 update, a year of healthy life was here given less weight at very young and old age than for other ages. Perhaps the more debated value choice built into the DALY, the age weighting has been subject to criticism. Of most importance in this regard is the paper by Anand & Hanson (1997), objecting that every year of life is of equal value, and that the age weights therefore fail on inequity grounds. Although it does concede that age weighting might be justified in a human capital framework, where productivity may differ throughout the life-stages, the ethical implications are found hard to defend. Still other voices their concern that such weighting goes against the principles for which the World Health Organization stands for (Arnesen & Nord, 1999). Furthermore it is pointed out that, if such a human capital approach were to be accepted, it fails to account for the societal conditions in a society. By that account the social consequences of disease or mortality amongst caregivers and providers, should largely depend on the social safety net available rather than age of onset/death. Following this logic it is also pointed out that social value of human loss will very likely differ in impact according to occupational groups, such as teachers and doctors. Clearly such a conclusion is discarded by the authors on the basis that health resources should be prioritized on the disadvantaged (Anand & Hanson, 1997, 1998).

We do recognize that valuating years of life differently on the basis of age, in which the equity vs. instrumental worth argument is based on, poses serious ethical implications in choice of design. This will be addressed later in this chapter. We will however try answering the basic principles in which appliance of age weights is built upon. Firstly, choice of age-weights derives from studies indicating a broad social preference to value a year of life lived in young adulthood higher than that of early and older stages in life (Johannesson & Johansson, 1997; Mathers et al., 2006; C. J. Murray, 1996; C. J. Murray & Acharya, 1997; World Health Organization, 2001b). This reasoning is by no means exclusive to the GBD studies from 1990 and 2004. From the very introduction of the years of life lost concept different weighting methods have been applied for measuring the social and economic loss of premature death. To illustrate, the cutoff age has been subjected to various changes where deaths over a certain age, or infant deaths have not been included to better address the loss of productivity (Logan & Benjamin, 1953; Perloff, LeBailly, Kletke, Budetti, & Connelly, 1984; Romeder & McWhinnie, 1977). Though the DALY does not use terms as “working age

period” or “potentially productive years of life lost”, one could argue that the age weighting inherent is a continuation of previous methods used to measure productivity, and so bears resemblance to the “human-capital” approach. Seen in this perspective we are inclined to agree that a design using age-weights may fail on inequitable grounds, although one could argue this is not the case, since everyone potentially lives through all stages of life (C. J. Murray, 1996). However, accepting differentiation in regard to age and sex does pose the question previously stated as for why neglecting other characteristics like income, educational attainment, social benefits and safety net available, occupation and more. An answer to this is given by Murray & Acharya (1997), pointing out two basic principles used in the DALY. First of is the proposition that the burden calculated for like health outcomes should be the same. Then, if all properties of the individual as mentioned above were to be accounted for, every health outcome would be unique, giving the “like as like” no meaning. Secondly it is argued that in calculating associated burden, the non-health characteristics of the individual affected by a health outcome should be restricted to that of age and sex (C. J. Murray & Acharya, 1997, p. 709). Answering the question whether resources should favor the disadvantaged or those groups contributing the most to society in terms of capita per citizen or other resources, the DALY approach is indifferent. As a result the combination of these two principles gives the DALY perhaps a more egalitarian flavor than what its critiques would acknowledge, and consequently differs from the strictly human capital approach as seen in welfare economics.

### **2.2.3 Application in research**

In our review of the available literature, we failed to find a clear pattern as for whether or not the application of social value choices was preferred. For those publications sticking to the original design of PYLL, the cut-of age was generally set at 75 years, although with exceptions (Law et al., 2011; Rockett & Smith, 1989b). It should be noted that the General Burden of Disease study from 2010, social value choices were discarded (C. J. Murray et al., 2012). This means that study designs in burden of disease studies would include, among other measures, the original potential years of life lost approach with different cut-off ages, and YLL with or without social value choices. Obviously these differences would influence results. However, both the original PYLL method and the YLL approach, social value choices inherent, show suicide as a top priority (Schopper et al., 2000). As for the GBD 2010 differing from prior publications this would likely have most effect for the burden associated to infant

deaths and mortality in the very young. We recognize the ethical arguments leading to this reasoning as sound. However, we do believe the application of social value choices serves its purpose where our study is concerned.

## **2.3 Ethical issues**

The previous section offers an explanation as to why social value choices have been applied. Still, ethical implication remains unaccounted for. One could object that in looking into the untimely and tragic deaths of adolescents and young adults in a cost efficient perspective we fail to recognize the true worth of a human being. This argument, derived from moral philosophy, e.g. Kant (1785/2012), implies that our motivation to prevent suicide either way should be founded in a belief that each single life is worth fighting for. An “end” in itself opposed to means to an end. Safe to say the death of a loved one causes suffering regardless of age or resources. Bearing this in mind we cannot stress enough the importance of distinguishing between personal tragedy and societal issues. Though shared cause, these distinctions do not necessarily tell the same story and it is because of this we need to make it clear whether our findings are related to one or the other. What we propose is that the personal perspective does not necessarily account for the relative significance of suicide when seen in a social context, building upon the distinction of “personal troubles” and “public issues” as described by Mills (1959/2000, p.8). This notion of “different stories” is illustrated in an Australian study by Doessel, Williams & Whiteford (2009b) where a comparison of measurements indicates suicide as a larger societal issue when the years of life lost approach is applied than with “headcount”. As a conclusion we are aware of ethical implication using the economic argument. However, we recognize that the matter of cost efficiency has over the years increasingly been taken into account by policy makers on a global basis, including the health sector (McDaid & Kennelly, 2009).

## **2.4 Data reliability**

As previously mentioned in our literature review, the reliability of the YLL measure depends on the quality and consistence of report system, labeling and registration of mortality, and consequently that of suicide deaths. Possible inconsistencies and irregularities in mortality data, and the interpretation of these, will influence our findings. Considering the length of time our data are covering we should therefore be aware that seemingly important findings



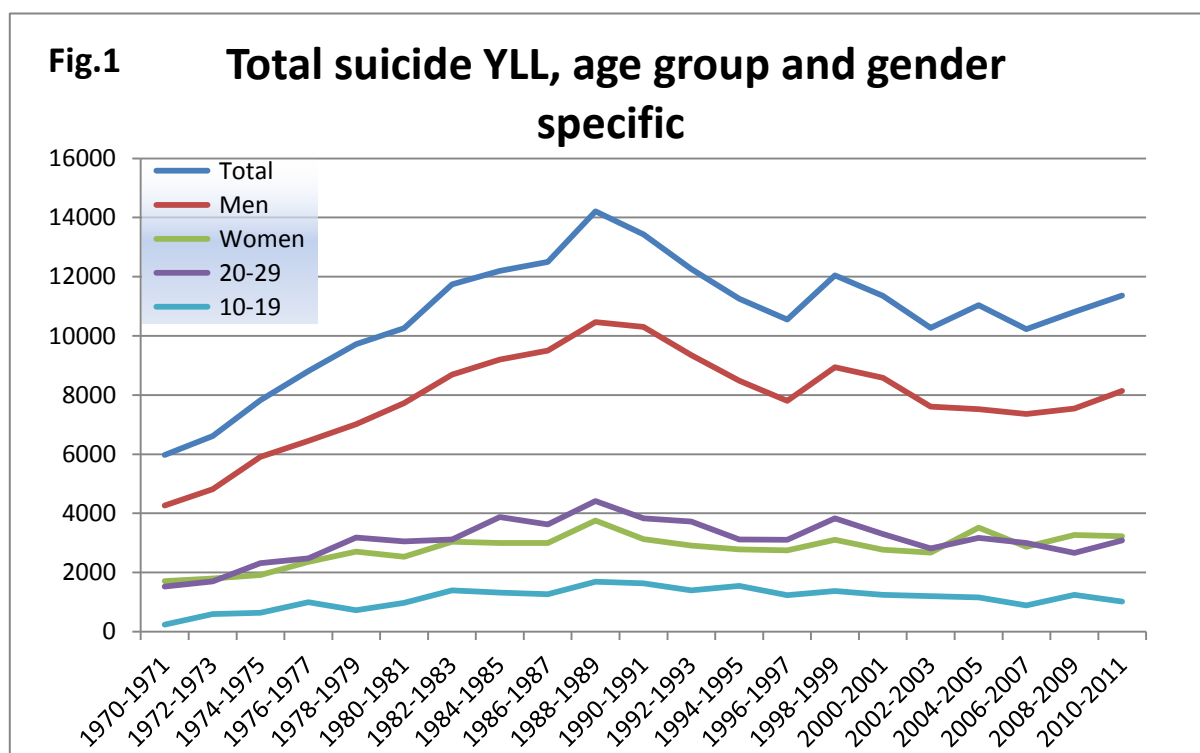
may mirror changes due to factors out of our reach (Nrugham, 2010). Picturing the “tip of the iceberg” we can assume that our data comes short in describing these issues just as they occur in real life. However, this fact does not necessary leave our data without significance. As Gjertsen (2000) points out, a given amount of uncertainty is tolerable as long as it stays within limits. Given past trials (Juel-Nielsen, 1982) we can be content that though there is a calculated uncertainty regarding the data, changes are not likely related to irregularities concerning the process of registration.

# 3 RESULTS

In this chapter we will present the findings of our study. Consisting of three main sections, the first part takes on the years of life lost due to suicide. Secondly, years of life lost due to overall cause is described. Last part combines the YLL data from suicide and overall cause both, comparing these results as they occur to get a better picture of the share of overall burden in which suicide in the young contributes to society. To clarify, we are dealing with both absolute and relative numbers. Total amount of YLL, along with age specific, and gender stratified data are presented. Additionally, proportion of suicide YLL within each respective gender is accounted for. Numbers are presented in two year intervals, consisting of the average numbers of YLL for that time period. Regarding the two age groups we will refer to these as 10-19 and 20-29 year olds. Each graph is followed by an interpretation of the data at hand. The main findings are then accounted for, progressing into a summary for each section.

## 3.1 Years of Life Lost due to suicide

### 3.1.1 Total YLL due to suicide, age group specific and gender stratified



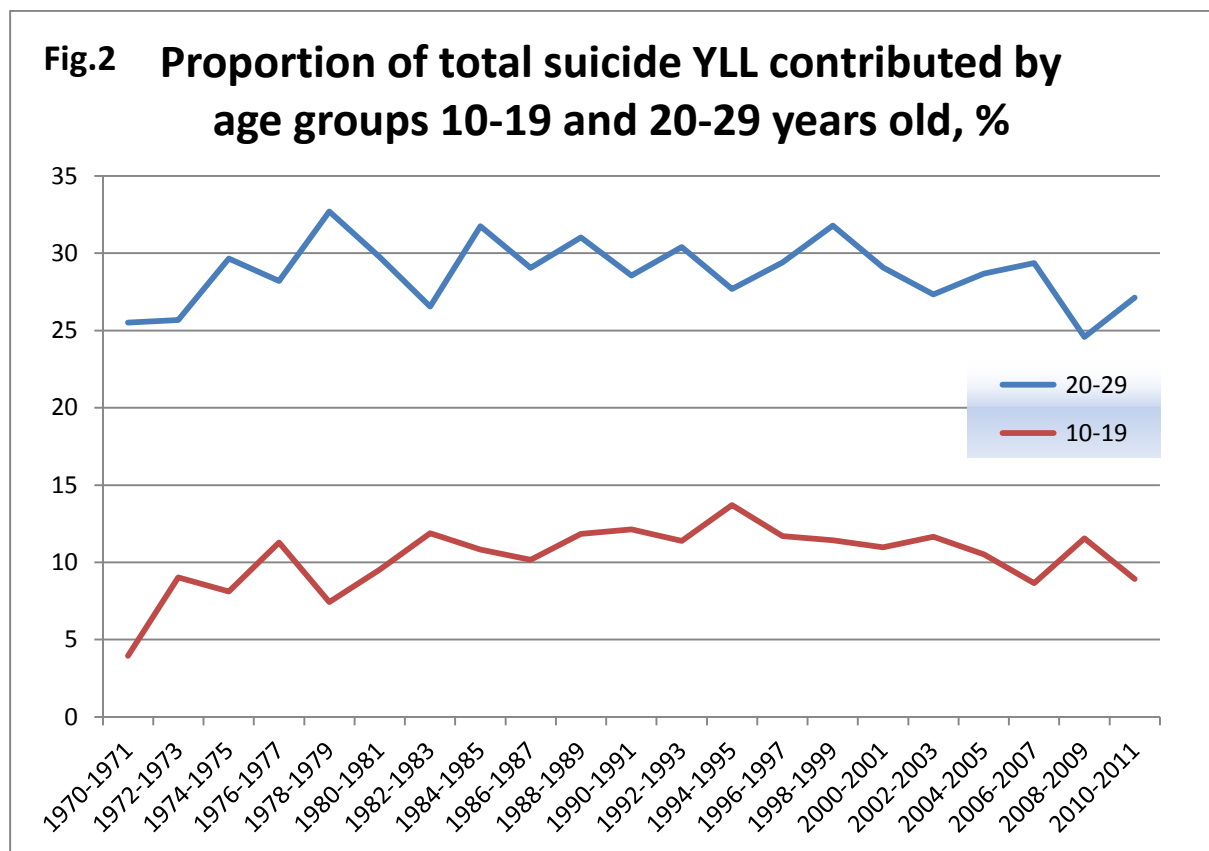
*Figure one* presents the total years of life lost due to suicide, *absolute* numbers. In addition it shows the numbers for age and gender separately. The values on the left side indicate the amount of years lost. Time period is divided into two year intervals, located at the bottom.

We see a definite increase in tendency regarding total years of life loss in the time-period spanning from the early seventies to the late eighties; approximately from below 6000 in 1970-71 to above 14000 in 1988-89, all ages, males and female. Men make up for the most part of years of life lost due to suicide. Following the peak in 1988, we find a downward trend, stabilizing somewhat come the later part of the nineties. It may seem that this is due to a considerable decrease in years lost amongst men. This trend is not equally apparent amongst women. Although a slight decrease in the mid-nineties, numbers tend to flatten out. There is a slight increase in tendency concerning both genders, women less so, following the years 2006-07. Additionally this chart is showing our chosen age-band, 10-19 and 20-29 years, both genders combined. Here we find increasingly higher numbers, resulting in a peak in 1988-89. Resembling the total YLL, this peak is followed by a decline in the mid-nineties and more so in age group 20-29 than amongst 10-19 year olds. Though there are similarities between these two age groups, in terms of tendency, the 20-29 year olds make up for the bigger part of years lost due to suicide.

To sum up we see an upsurge of total YLL 1970-71-1988-89, followed by considerable decrease. Numbers are flattening out in the mid/late nineties. Slight increase total YLL later years. Numbers are not returning to the values as seen in the early seventies. Men make up for most YLL, reflecting the total amount. The downward trend following the peak in 1988 is less clear amongst women. Although both age groups show to some extent the same tendency as the total, this is more prominent amongst the 20-29 year olds. This group also has a bigger share of YLL throughout the time period. This would suggest that the trend in total YLL is slightly positive in later years, or at least serves as an inclination that numbers are not returning to values past. Although women make up for a smaller part of YLL, the overall picture for women in general is that of an increase throughout the time period.

*Figure two* concerns the two chosen age groups, not stratified by gender. Opposite to figure one, we are now looking into *relative* numbers. What we are interested in is the proportion of the total amount of years of life lost due to suicide, in which the chosen age groups contribute to.

### 3.1.2 Proportion of total YLL, age group specific

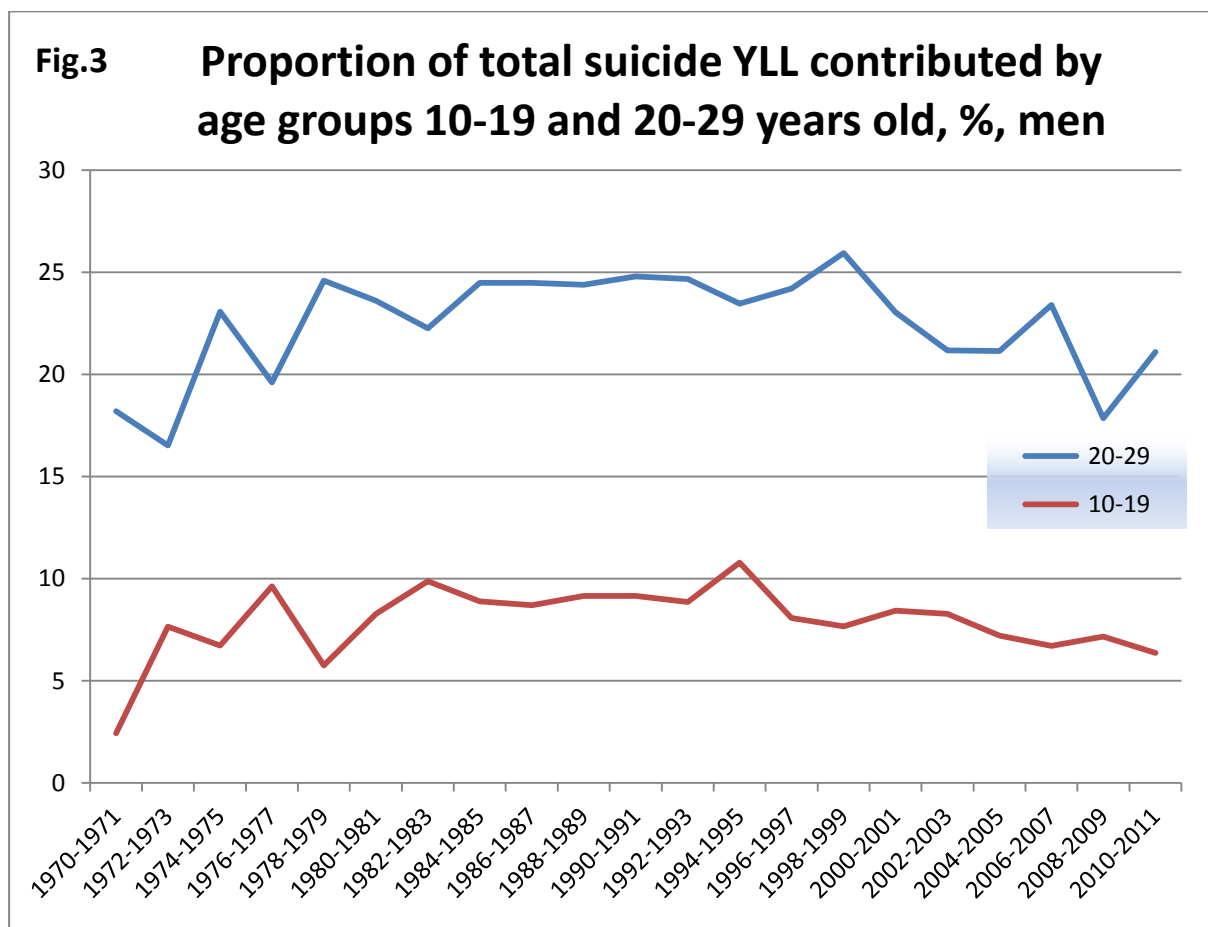


In *figure two* we find a rise amongst the 10-19 year olds from early seventies to a peak in 1994-95, ranging from 3.95% to 13.71% of total YLL. Following this peak, percentage seems to flatten out and decline somewhat, though in later years this is ambiguous at best. In the elder group numbers tend to be more stable, ranging from 32.71% in 1978-79, to 24.58% in 2008-09. Looking at the two age groups together, a considerable higher proportion of years of life lost due to suicide is found amongst age group 20-29 years.

What we see here is that despite the depiction in figure one of a definite increase in total YLL up until the late eighties, the proportion of YLL in the young were not diminished. On the contrary, we find an increase amongst the 10-19 year olds. It should be noted a slight decrease amongst both age groups in recent years. Keeping in mind recent years downward trend/flattening out in total YLL it may seem like this may reinforce the relative significance of suicide in at least the very young. What is most clear is that age group 20-29 has a relatively high proportion of YLL. Here we failed to find any clear pattern in terms of upward or downward trends, though later years show some decrease in numbers.

Figure two shows no distinction regarding gender. Next we will look into whether differences may be found comparing YLL as they occur in the two age groups, gender stratified. Given the vast differences in absolute numbers between total and age/gender specific groups, comparison in absolute numbers proves difficult. We will therefore stick with the *relative* numbers for the time being.

### 3.1.3 Proportion of total YLL contributed by young age groups, gender stratified



**Fig.4 Proportion of total suicide YLL contributed by age groups 10-19 and 20-29 years old, %, women**

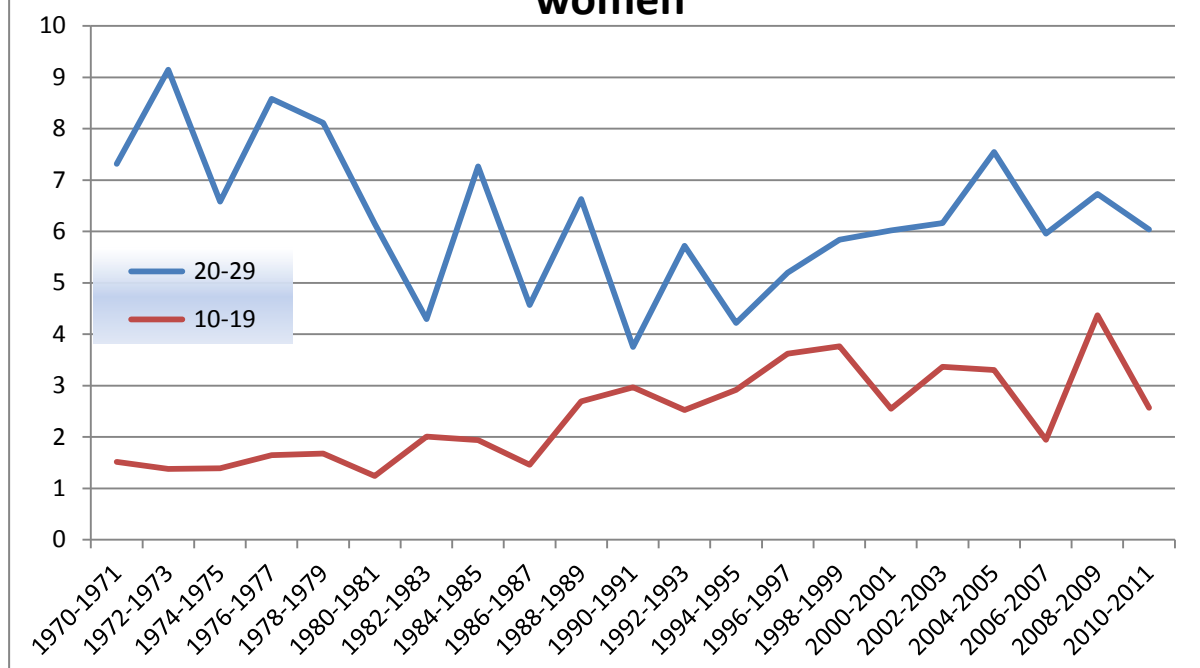


Figure three depicts proportion of total suicide YLL in which the two male groups contributes to. Remembering figure two, the 20-29 year olds make up for the bigger share. Following an increasingly higher proportion of total YLL, the 10-19 year olds peaks at 10.79% in 1994-95, while age group 20-29 years old does so in 1998-99, reaching 25.95%. What follows is a decrease in both age groups. While the two age groups amongst men tend to mirror each other, in terms of tendency, this is not the case in women. This is shown in *figure four*.

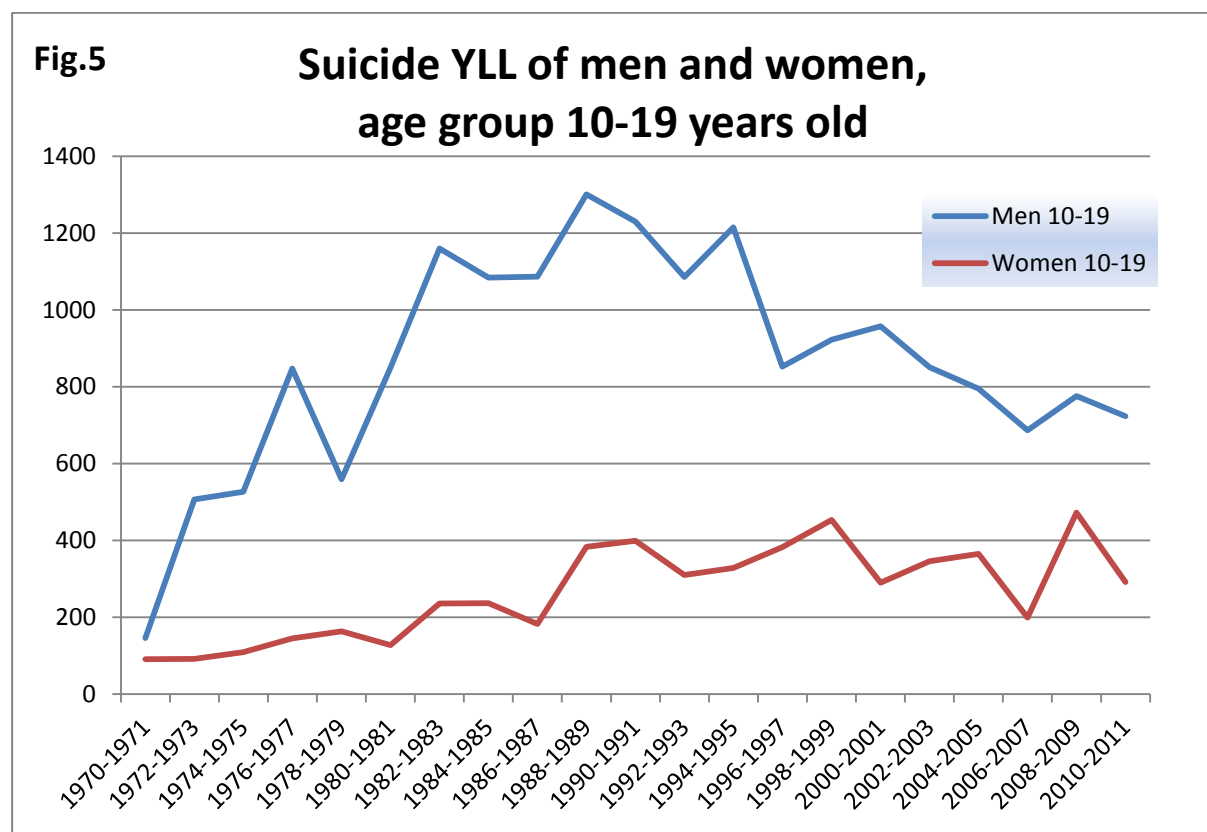
Firstly, both age groups differ throughout the time period proportion-wise. In 1970-71 we find women, age group 10-19 years with a percentage of 1.52 while 7.32 % in age group 20-29.

The following years brings a decline amongst the 20-29 years old. Combined with an increase amongst 10-19 years old, this seems to be bridging the gap up until the mid- nineties. From the mid-nineties we are looking at an increase amongst women aged 20-29 years, while numbers in age group 10-19 years seems to flatten out somewhat. Opposite to what found in men, we do not see a decline amongst the 10-19 year old women. Besides some fluctuations, and a less than clear decline following the year 2000-01, the trend of increase seems relative stable throughout the time-period. Women, age group 20-29 years stands out as the only group, counting both genders, where a decline during the seventies and eighties is present. Come mid-nineties however, this trend is replaced by a raise in proportion.

To sum up we find an increase in proportion of total suicide YLL amongst men 10-19 and 20-29 years old, flattening out in the mid-nineties. This is followed by a decrease, both groups, from the late nineties. Men, 20-29 years old, make up for a relatively large share of YLL. Women, aged 20-29 years, is the only group where a decrease in proportion is found in the first part of the time period, and is replaced by a marked increase proportion wise following the early nineties up until 2010-11. Amongst women, 10-19 years old, we find a relatively stable increase throughout the whole time period. It should be noted that this is the only group with a more or less consistent increase. While men, 20-29 years old, make up for a large share of YLL, the rise in proportion amongst women, age group 10-19 years old, should cause to worry.

A question that arises is whether these changes in proportion are due to actual ups and downs in years of life lost. To put it differently, are years of life lost amongst women, 10-19 years old, more commonplace in recent time compared with early seventies, or is this rise in proportion a mere consequence of a decline in male suicide YLL? To answer this we will look into *absolute* numbers, age specific and gender stratified.

### 3.1.4 Suicide YLL of young age groups, gender stratified



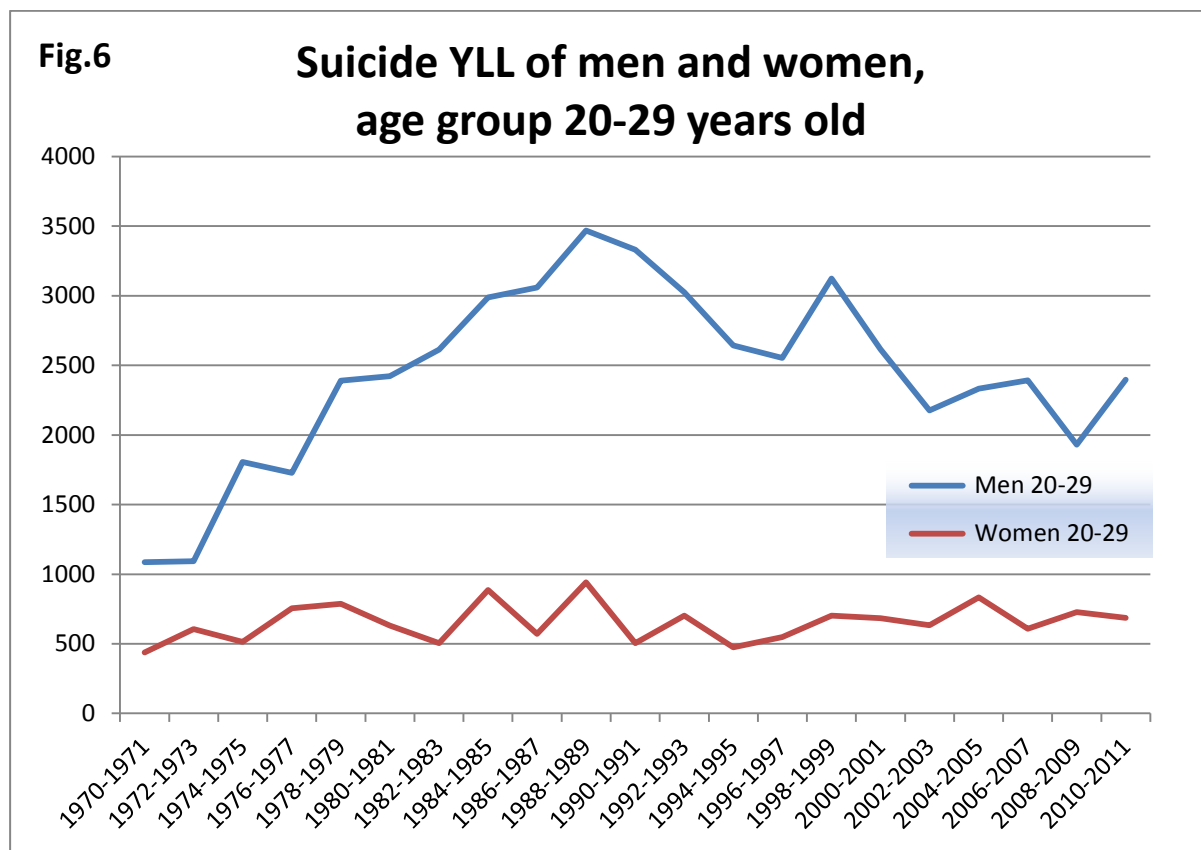


Figure five shows age group 10-19 years, absolute numbers, stratified by gender. Looking into the male group we see a distinct raise up until the years 1988-89. This is followed by a marked decrease throughout the rest of the time-period, and so bears resemblance to what we found considering total YLL. One could also argue that these numbers, to some degree at least, mirrors those of which we see in percentage of total YLL amongst 10-19 year old men. Resembling what we found in women proportion-wise, there seems to be a relative stable increase amongst female group aged 10-19 years during the whole time period. Even though there are considerable fluctuations, this trend seems to flatten out in recent years. So far it looks like there is a resemblance between proportion and absolute numbers.

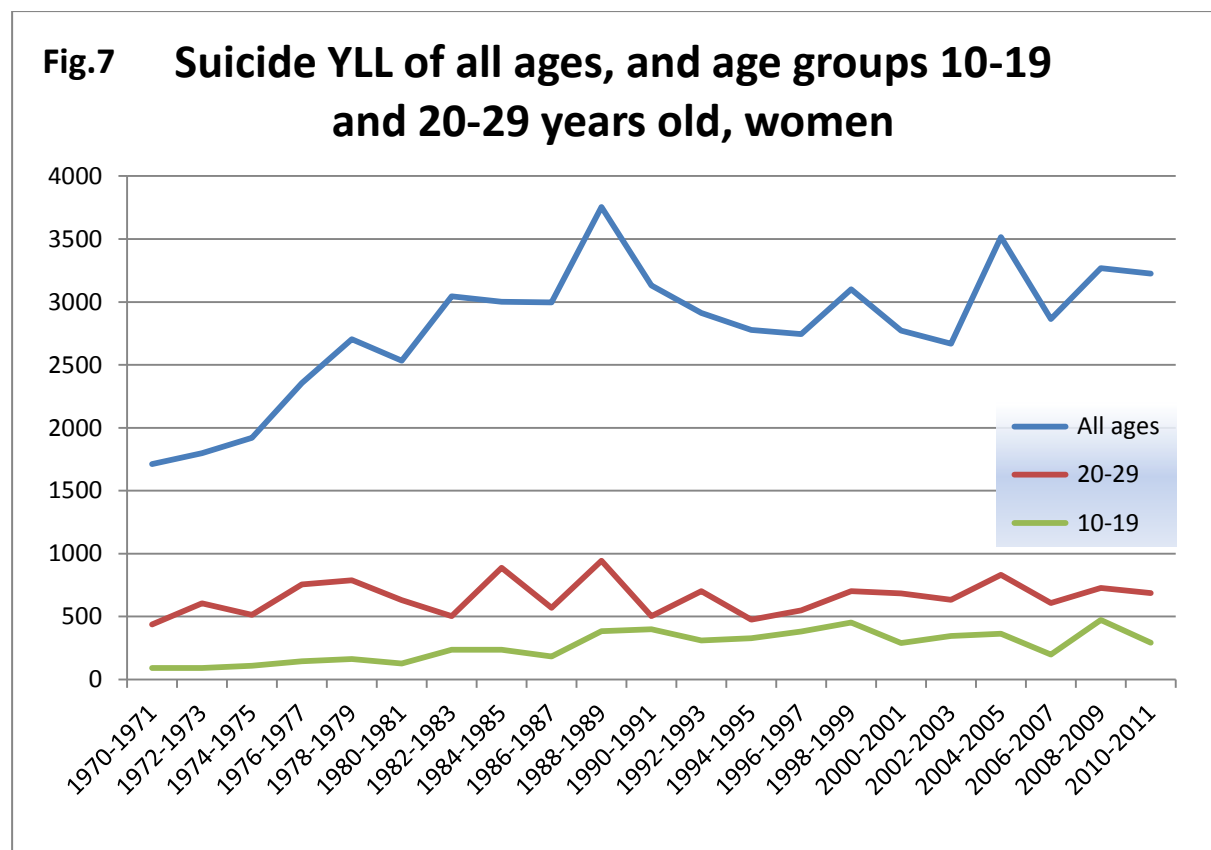
Figure six shows years of life lost in the age group 20-29 years, men and women. Looking at men, we find fairly similar trends as of that in the total YLL. Concerning women, 20-29 years old, we find that numbers are relatively stable throughout the time period. Changes, if any, are that of a slight increase. Now if we look back to figure four, we remember that the proportion amongst women was subjected to both marked decrease and increase. Looking at our present table though, we fail to find the same pattern. This would lead us to the conclusion that said changes in proportion are due to rise and fall in the total YLL as seen in figure one.



Our main findings are that YLL lost in men, both age groups follows the trend of the total numbers. Though contributing to a smaller amount of YLL when compared to men, we fail to see a decrease amongst women, both age groups, throughout the time period. This would suggest that although later years shows a decrease in total YLL, this is not the case amongst women aged 10-19 and 20-29 years old.

Sticking to *absolute* numbers we proceed with two charts, taking a closer look on suicide YLL in women, all ages and age specific.

### 3.1.5 YLL women: All ages and young age groups



**Fig.8 Suicide YLL in young women, of age groups 10-19 and 20-29 years old**

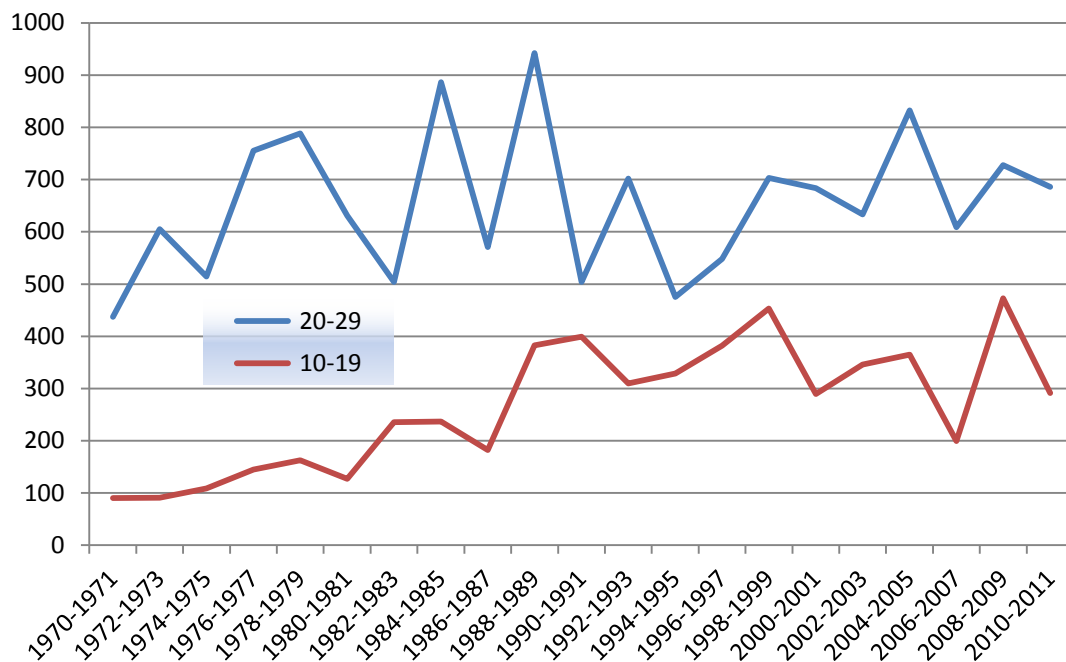


Figure seven and eight give a closer look into YLL in women all ages, in addition to the age specific numbers as previously shown. In figure seven we see a slightly different picture than before concerning the female population in general. The upward trend following early seventies seems more prominent. Though peaking in 1988-89 the following downward trend which we found in the total YLL, is less clear. There is a distinctive decline in YLL amongst women all ages the first part of the nineties. Numbers seems to stabilize somewhat come the mid-nineties, although characterized by fluctuations. The overall picture the whole time-period considered is that of an upward trend in women all ages.

As previously noted, the two age groups differ somewhat regarding trends, where numbers in age group 20-29 years tend to be more stable, at least at first sight. Given a closer look, as seen in figure eight, numbers seems to differ to a great extent from one period to another. Though these fluctuations are striking, it is difficult to figure out a pattern on the basis of these data. All we can say is as previously stated, that even though there are fluctuations, numbers tend to be more stable compared with men in same age group, at least when looking at the whole time period. Similar to what we found in figure one, women aged 20-29 years make up for the bigger part of YLL. Women aged 10-19 years have a relatively consistent

increase. The increasing trend amongst women, throughout the time period, all ages and age specific, should be cause of concern.

In figure two, three and four, regarding proportion, numbers were based on the total amount of suicide YLL. This meaning both genders, all ages combined. Now, sticking to age specific data in female group, the basis of proportion will be that of the amount of suicide YLL in women, all ages combined. Relative numbers are presented.

### 3.1.6 Proportion of female suicide YLL, contributed by young age groups

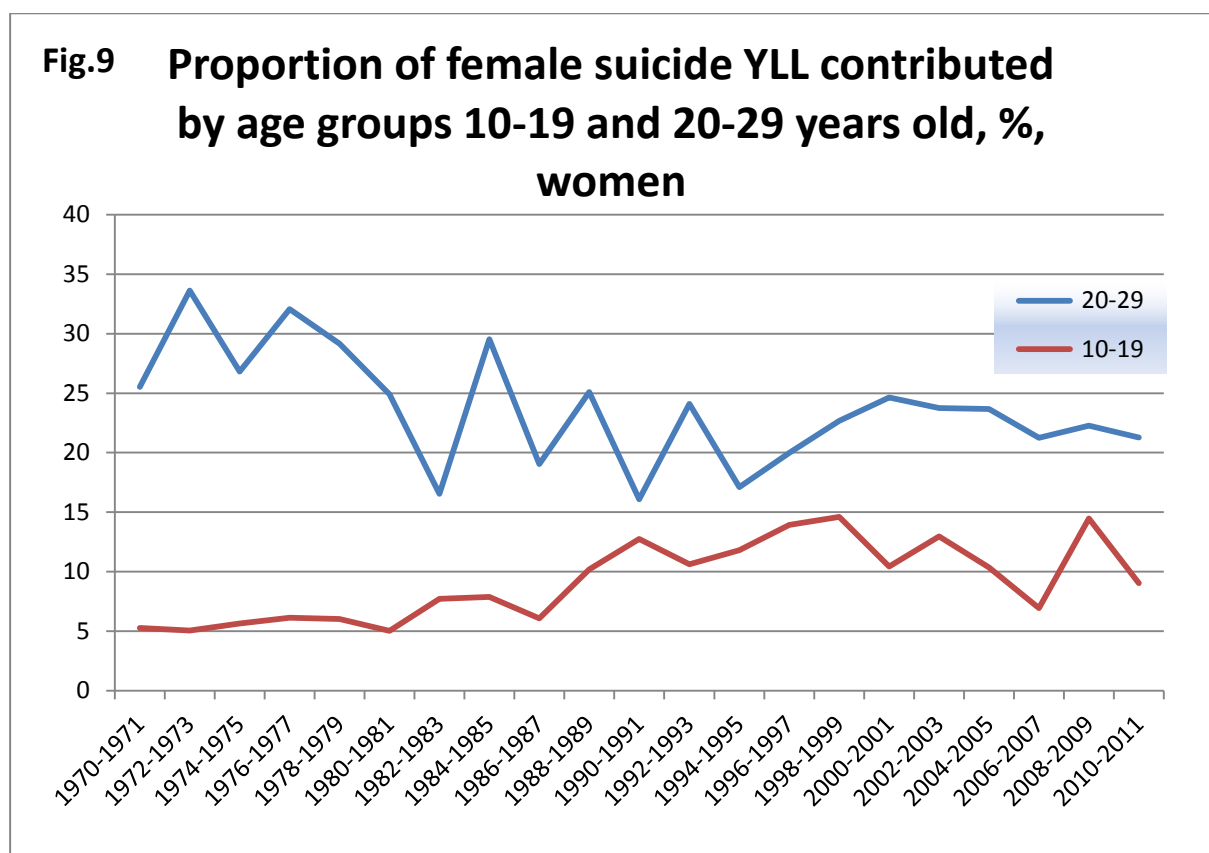


Figure nine contains the proportion of YLL amongst women 10-19 and 20-29 years old, when compared to female suicide YLL in general.

We see the proportion of YLL in age group 20-29 years decline until the mid-nineties, before flattening out later years. This is not too different from what we found regarding percentage of total YLL, as seen in figure four. Here we also found a decrease in percentage up until mid-nineties. But instead of flattening out, as we see in figure 9, we saw more of a rise in percentage later years. What this again suggests is that even though the proportion of YLL in

women, 20-29 years old, has varied, the absolute numbers may have not. At least they do not mirror the trend seen in proportion.

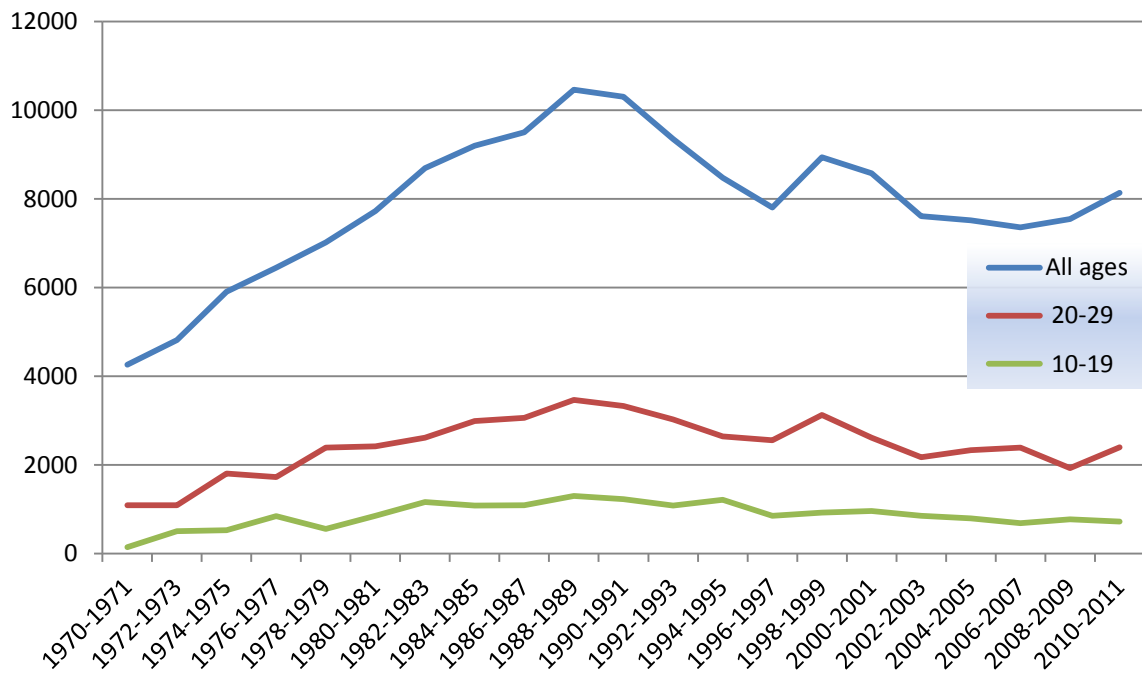
Concerning age group 10-19 years, the story is different. In the case of female suicide YLL, we here see a steady rise in proportion up until the 2000s. After that numbers tend to fluctuate. We should be able to explain this by coinciding rise in suicide YLL in women all ages. Nevertheless, the impression throughout the whole time period is that of increased proportion. Now, looking back at figure four in section 3.1.3, the proportion of the *total* YLL was also rising. We may propose two possible explanations. Firstly, increasingly higher numbers in YLL amongst women, said age-band. Second, a response to the upward and downward trends found in men regarding YLL. If we now look at the absolute and relative numbers we find both explanations may hold some truth. To put it short, it may seem like the proportion found amongst 10-19 years old women increases throughout the time-period when compared to the total YLL, and YLL women, all ages. This would indicate that not only has there been an increase in proportion. This is likely due to an actual upward trend in years of life lost among 10-19 year old women.

To sum up, change in proportion amongst 20-29 year old women may be due to rise and fall in total numbers and suicide YLL amongst women in general. Changes amongst 10-19 year olds are more likely based on an actual increase, which is confirmed by absolute numbers. Though fluctuations, women 20-29 years old remains the only group in our study where numbers seems relatively stable throughout the time period, were absolute numbers are concerned.

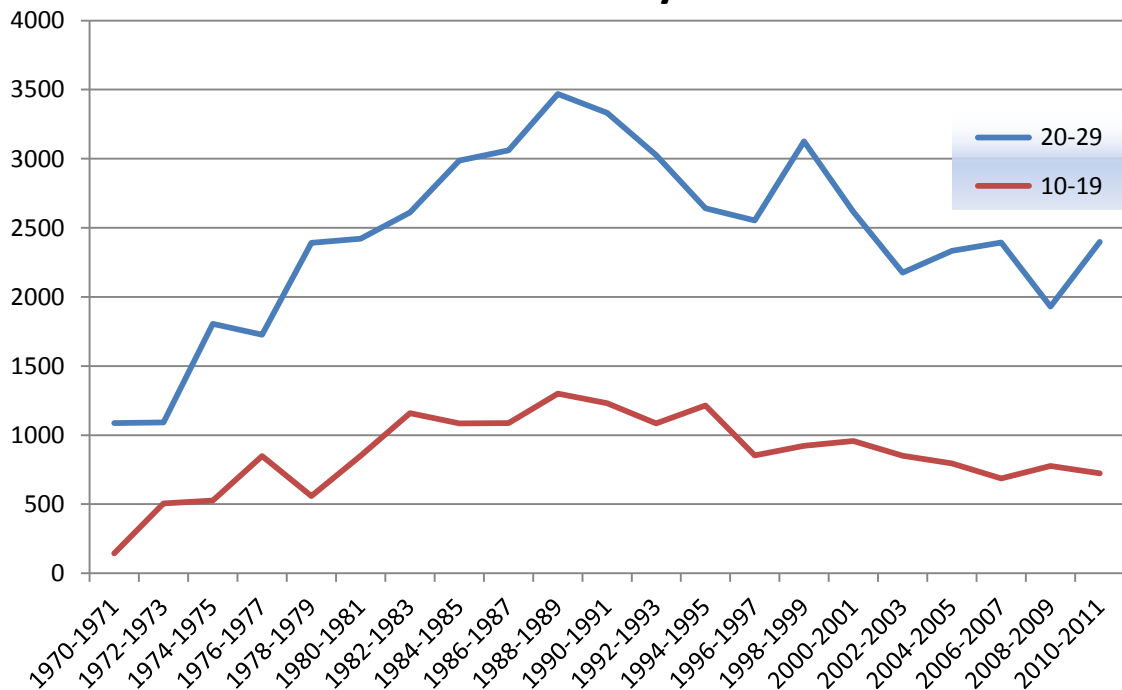
In the next two sections we repeat the three previous figures, now with a male perspective. Section 3.1.7 presents absolute numbers in men all ages and age specific groups. Section 3.1.8 presents relative numbers, relating to the proportion of male suicide YLL in which is contributed by the two chosen age groups.

### 3.1.7 YLL men: All ages and young age groups

**Fig.10 Suicide YLL of all ages, and age groups 10-19 and 20-29 years old, men**



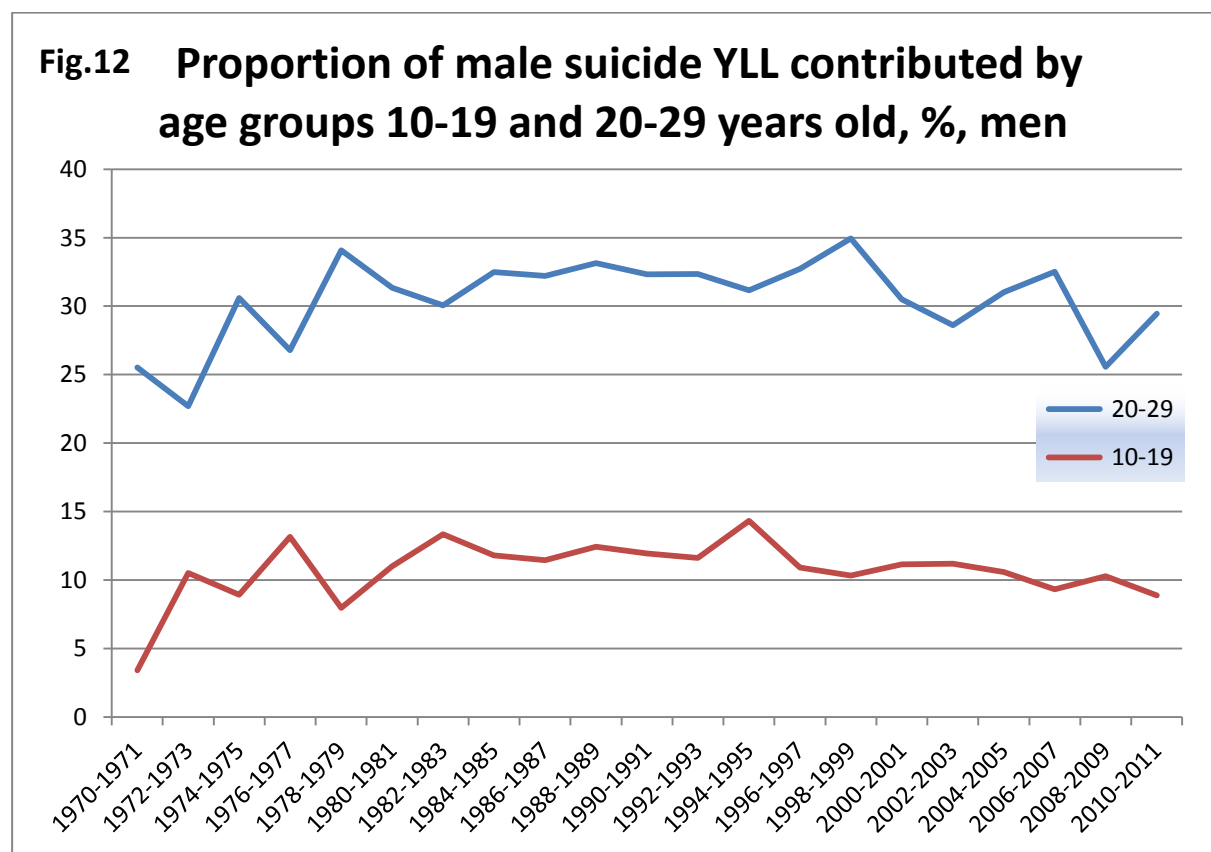
**Fig.11 Suicide YLL in young men of age groups 10-19 and 20-29 years old**



*Figure ten and eleven* gives a closer look on years lost in men, all ages and age specific. As previously stated, men make up for the most part of the total YLL. It is therefore close resemblance between YLL, men- all ages and the total. Again we see fairly similar trends in the two age groups, and again we find a bigger proportion of YLL in the 20-29 year olds.

Continuing with age specific data in male group, the basis of proportion will be that of the amount of suicide YLL in men, all ages combined. Relative numbers are presented.

### 3.1.8 Proportion of male suicide YLL, contributed by young age groups



*Figure twelve* contains the proportion of YLL amongst men 10-19 and 20-29 years old, when compared to male suicide YLL in general.

Considering proportion we find similar patterns as to those seen in figure three, section 3.1.3. There is a rise in proportion, both age groups, flattening out and declining come early nineties. We do not know what this means. One could be tempted to say that previously

described rising and falling trends in YLL amongst men, all ages, to some extent are due to suicide in young men.

Looking at the relative and absolute numbers, as seen in the previous section, we would suggest that men, especially so the 20-29 year olds, contribute to the rising trend in total YLL, and consequently the decline in later years.

### **3.1.9 Summary**

Total YLL increased throughout the time period, reaching a peak in the late eighties followed by a decline. Numbers did not return to values past. A higher proportion of years of life lost were found in age group 20-29 years old, not stratified by gender. Looking at gender and age groups separately, numbers tended to differ. Men, both age groups seemed to mirror changes found in the total YLL. Men, 20-29 years old, made up for a relatively large share of YLL. Women, 10-19 years old, stood out as the only age group, both genders combined, where a slow but relatively steady increase was seen throughout the whole time-period. Numbers concerning women aged 20-29 years tended to be more stable, at least when looking at the bigger picture. We argue that changes in proportion regarding YLL in the female population may be explained by an actual increase in YLL. Though this may be the case for 10-19 year old women, it seems like some of the changes in proportion, at least amongst women aged 20-29 years, are due to fluctuations, upward- and downward trends found in other groups. We found this was the case when comparing to male suicide YLL, all ages and age specific, female suicide YLL, all ages and age group 10-19 years old, and consequently the total YLL.

As previously stated our initial concern was that of younger age groups failing to mirror the later years decrease in the total suicide rate. To a large extent same pattern was found using YLL as measurement. Similar to the suicide rate, decline was prominent in men, age group 20-29 years, and the overall picture painted suicide as a proportionally higher issue in age group 20-29 years old, both genders, than what was found amongst the 10-19 year olds. As of the suggestion of less favorable trends in the young this was confirmed, and to some extent emphasized, by using the YLL-measure. Of special significance was the increase in YLL due to suicide in women 10-19 years old. By this note the relative significance of suicide amongst the young would seem to increase using both the traditional suicide rate and YLL approach.

These data indicates that although later years shows a decline in total YLL due to suicide, this is not the case amongst women aged 10-19 and 20-29 years. While men, 20-29 years old, make up for a large share of YLL, the rise in proportion amongst women, lower age group, should cause to worry.

In this section we have looked into suicide YLL in the time period 1970-71 – 2010-11. Next we will take on years of life lost due to overall cause. Total YLL is presented along with gender stratified and age specific numbers.

## 3.2 Years of Life Lost due to overall cause of death

### 3.2.1 Total YLL, gender stratified

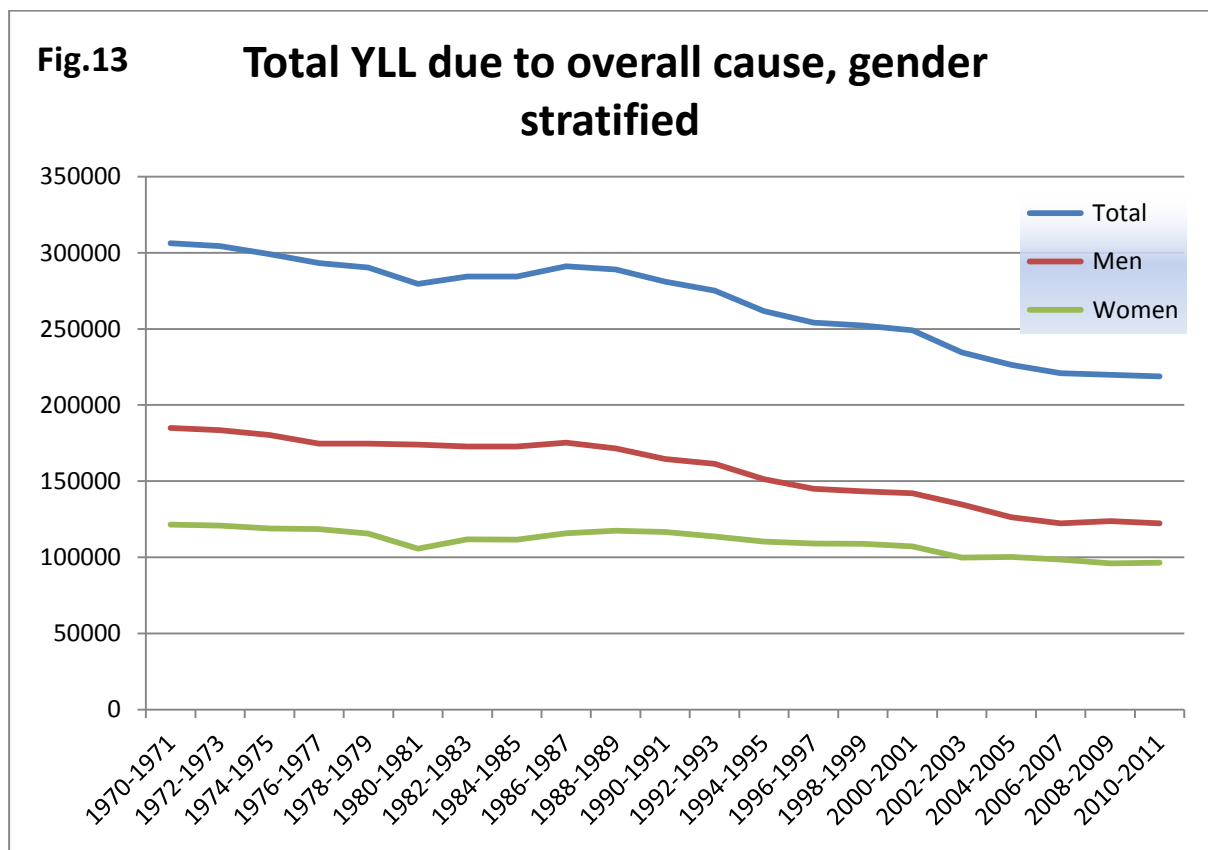


Figure 13 presents absolute numbers regarding the amount of YLL due to overall cause of death. This is the full amount of years of life lost that society misses out on due to all causes. We find a definite decline in total YLL. This is relatively consistent throughout the whole time-period, with a total of 306264.57 years of life lost in 1970-71, to 218753.37 years of life



lost in 2010-11. Men make up for the bigger part of years of life lost. Decline is prominent in both genders, more so in men.

Next we will further look into absolute numbers, age specific and gender stratified.

### 3.2.2 Total YLL, age group specific and gender stratified

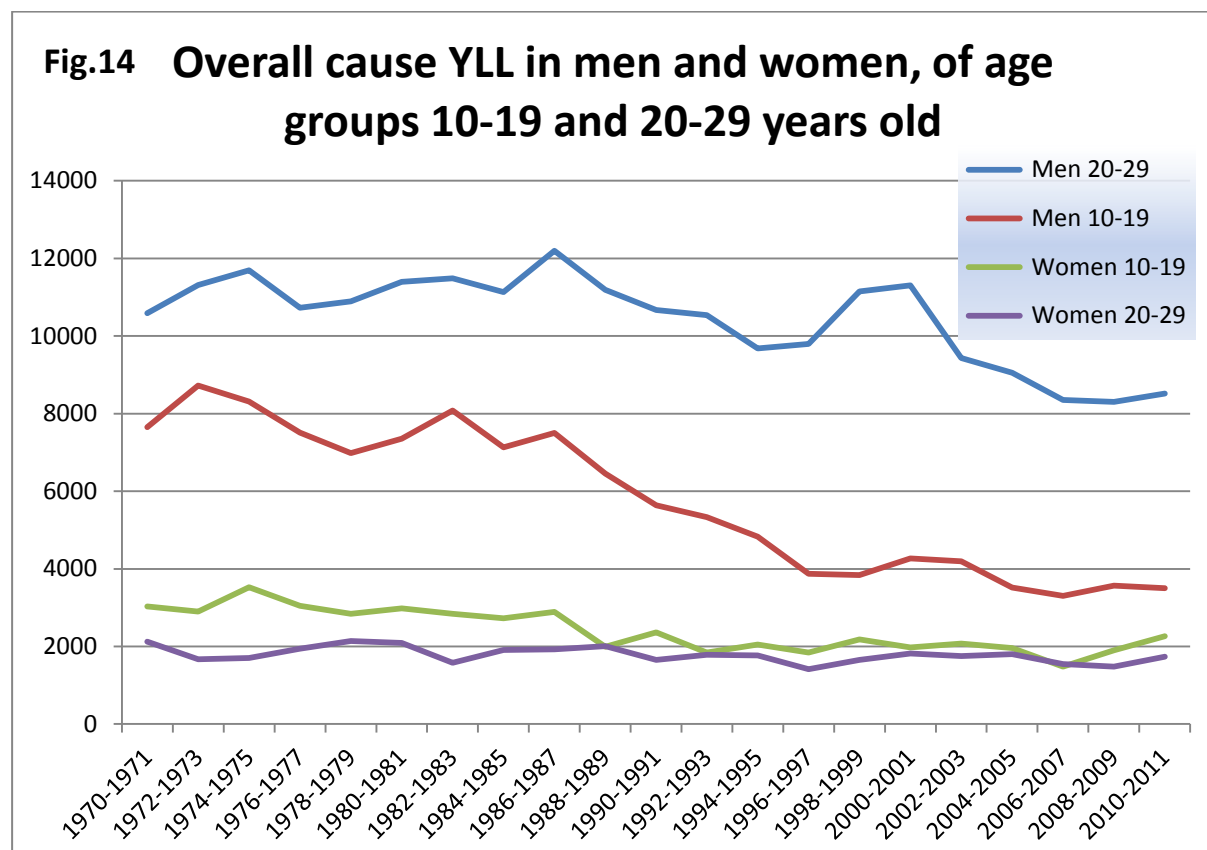


Figure 14 presents absolute numbers regarding the amount of YLL due to overall cause of death, age specific and gender stratified. Numbers concerning men, both age groups, tend to mirror those of total overall cause YLL in terms of tendency. Note that burden is higher in age group 20-29 years old. YLL in women tells a different story. Here the 10-19 year olds account for the higher loss in years. Also, the decrease in YLL is more significant in the younger group than what we find amongst the 20-29 year old women.

### 3.2.3 Summary

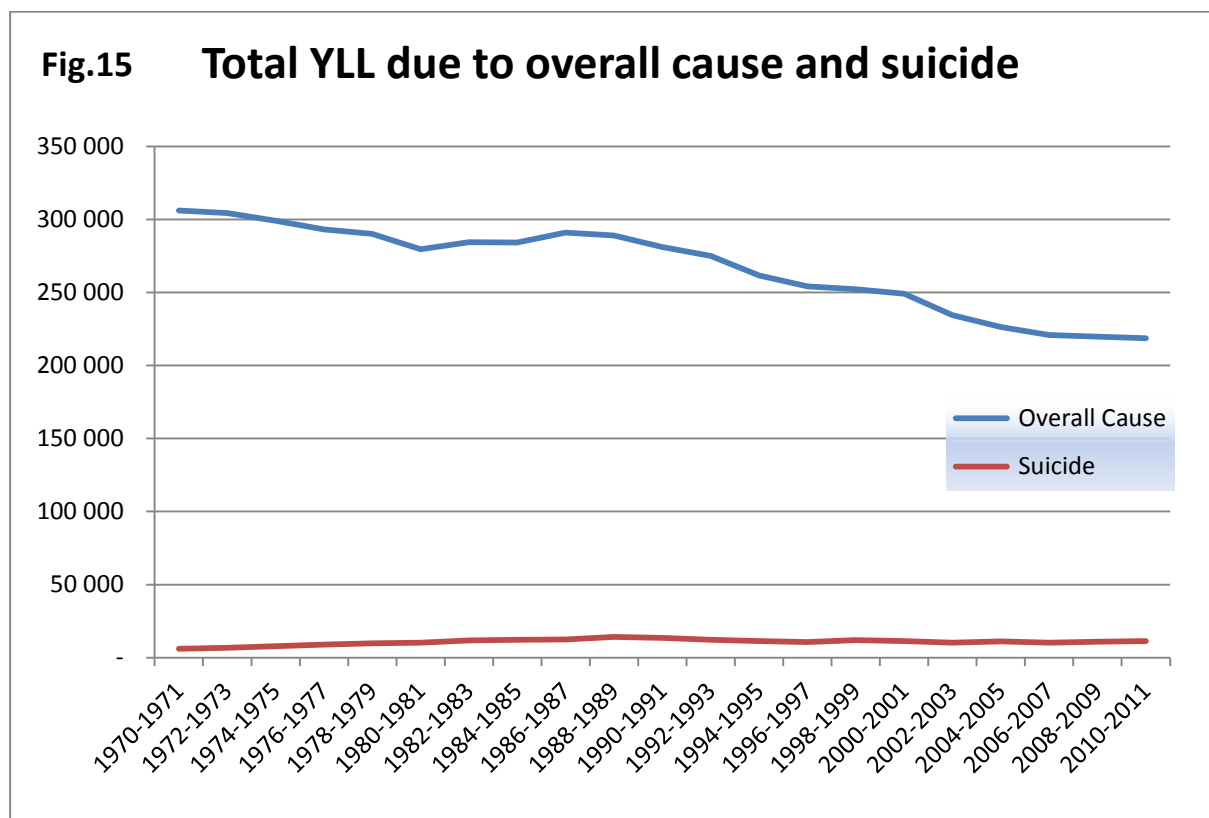
We found that the total YLL due to overall cause decreased significantly throughout the time period. Similar trends was found in both genders, all ages, as well as chosen age groups.

Women 10-19 years old seemed to stand out contributing to a higher amount of YLL when compared to women 20-29 years old. Numbers in the latter group tended to be more stable than any of the others, although the tendency also here was that of a slight decline.

We would suggest that while years of life lost due to overall cause has decreased significantly the past three decades, this may not be the case with suicide YLL. This would imply that the relative significance of suicide, along with an actual rise in some age groups, has increased the past years. Next we will do further comparison between years of life lost due to suicide and overall cause of death.

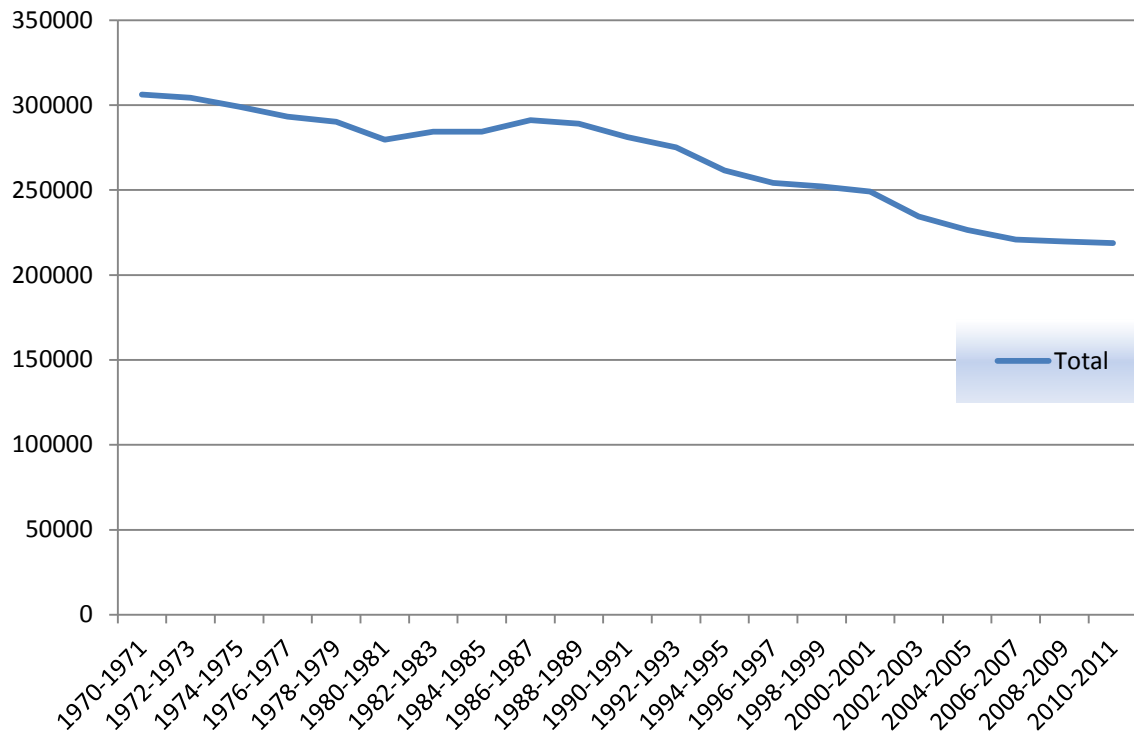
### 3.3 Comparison of Years of Life Lost due to suicide and overall cause of death

#### 3.3.1 Total YLL due to suicide and overall cause of death



**Fig.16**

### Total YLL due to overall cause



**Fig.17**

### Total YLL due to suicide

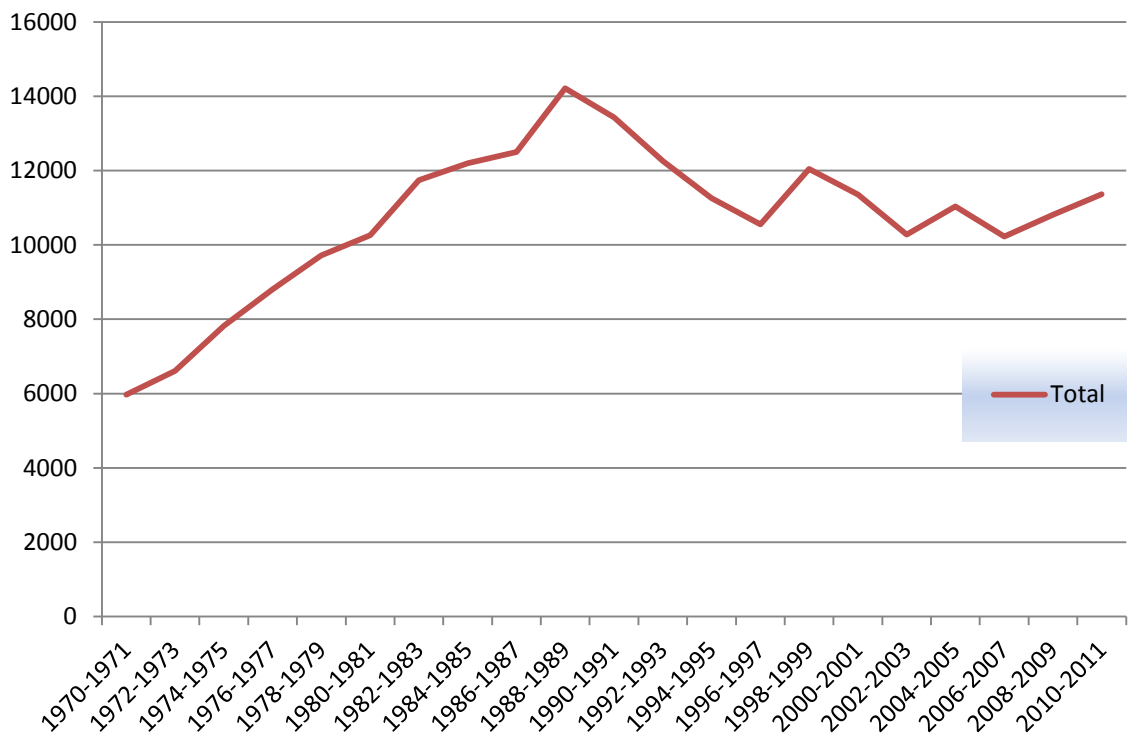
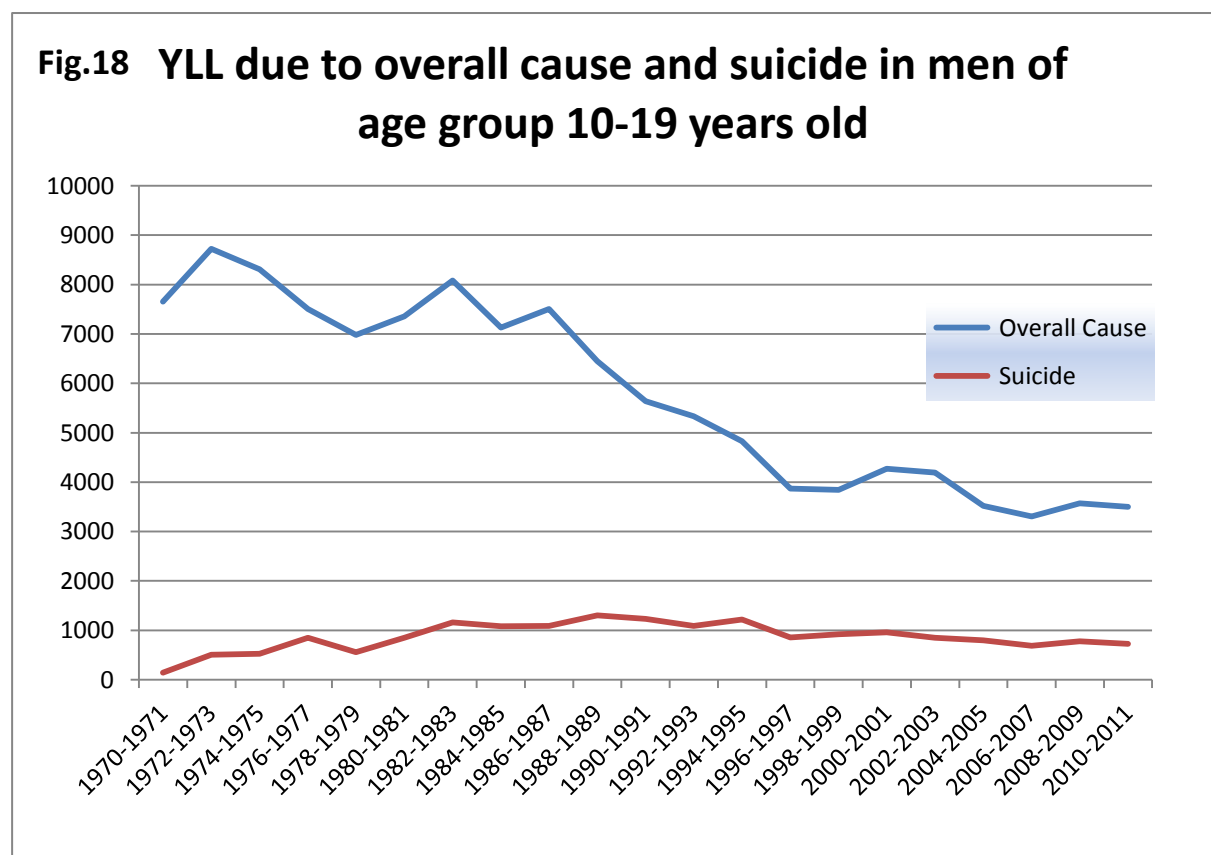


Figure 15,16 and 17 show total YLL due to overall cause and suicide. Obviously the numbers presented in figure 15 makes comparison difficult, given the vast differences in absolute numbers. Nevertheless, it illustrates that YLL due to suicide contribute with a relatively small amount when compared to overall cause YLL. However, figure 16 and 17 are describing two trends opposite, which would suggest that the relative significance of suicide is increasing. Be that as it may, our concern is not comparing the total years of life lost. Our concern is that of suicide in the young. In what follows, suicide YLL and overall cause YLL is compared, first in men, then in women. Absolute numbers are presented, age specific.

### 3.3.2 YLL due to suicide and overall cause of death, age group specific and gender stratified



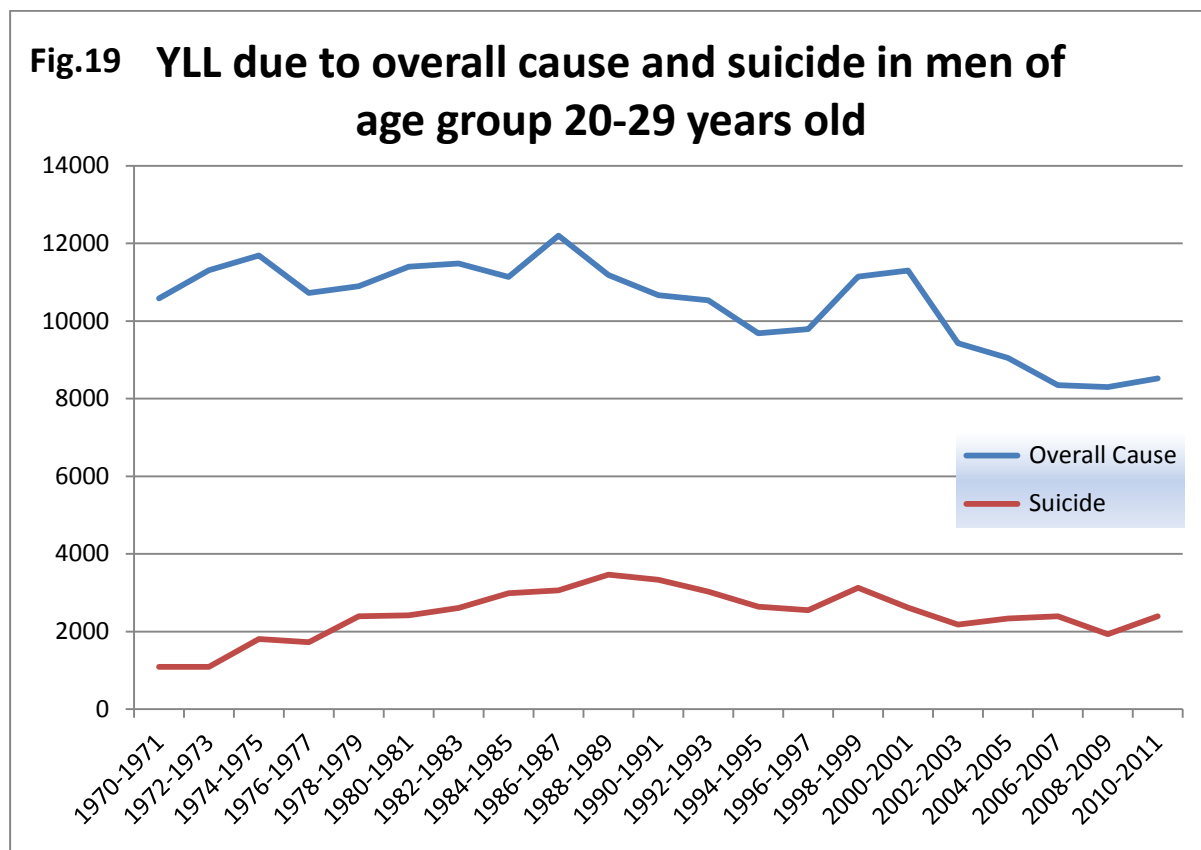
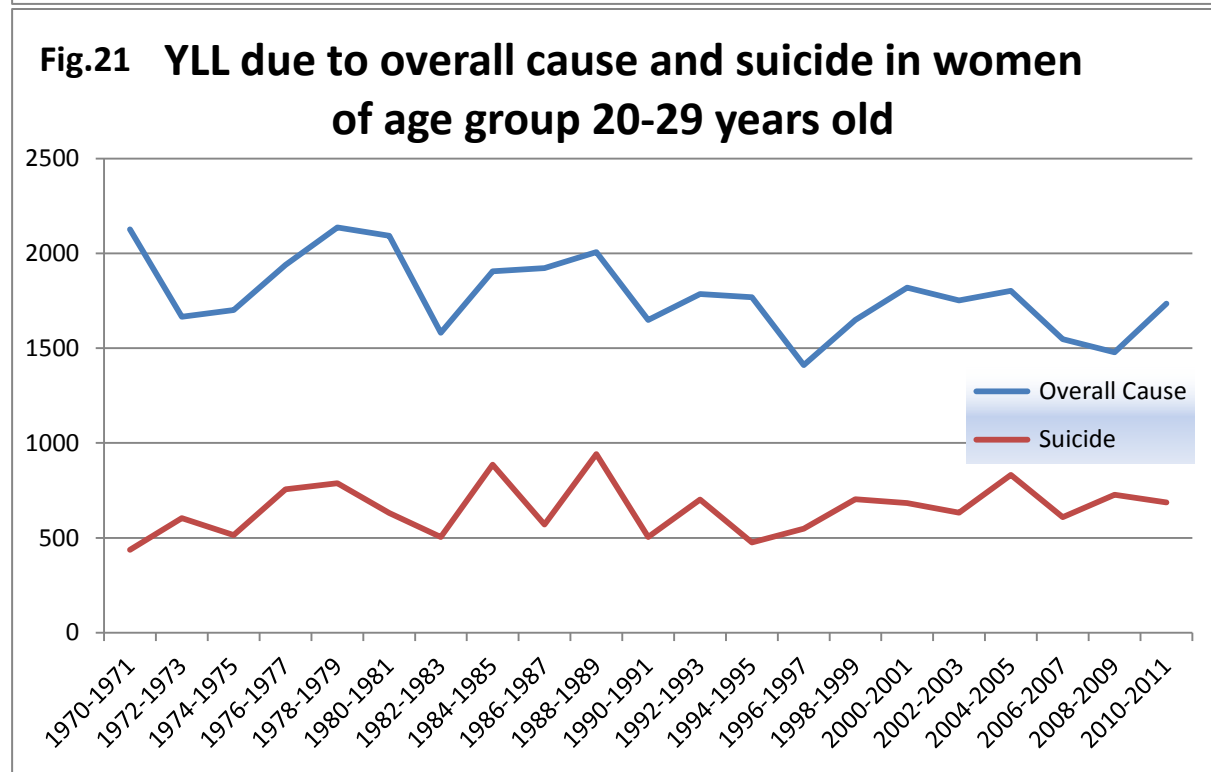
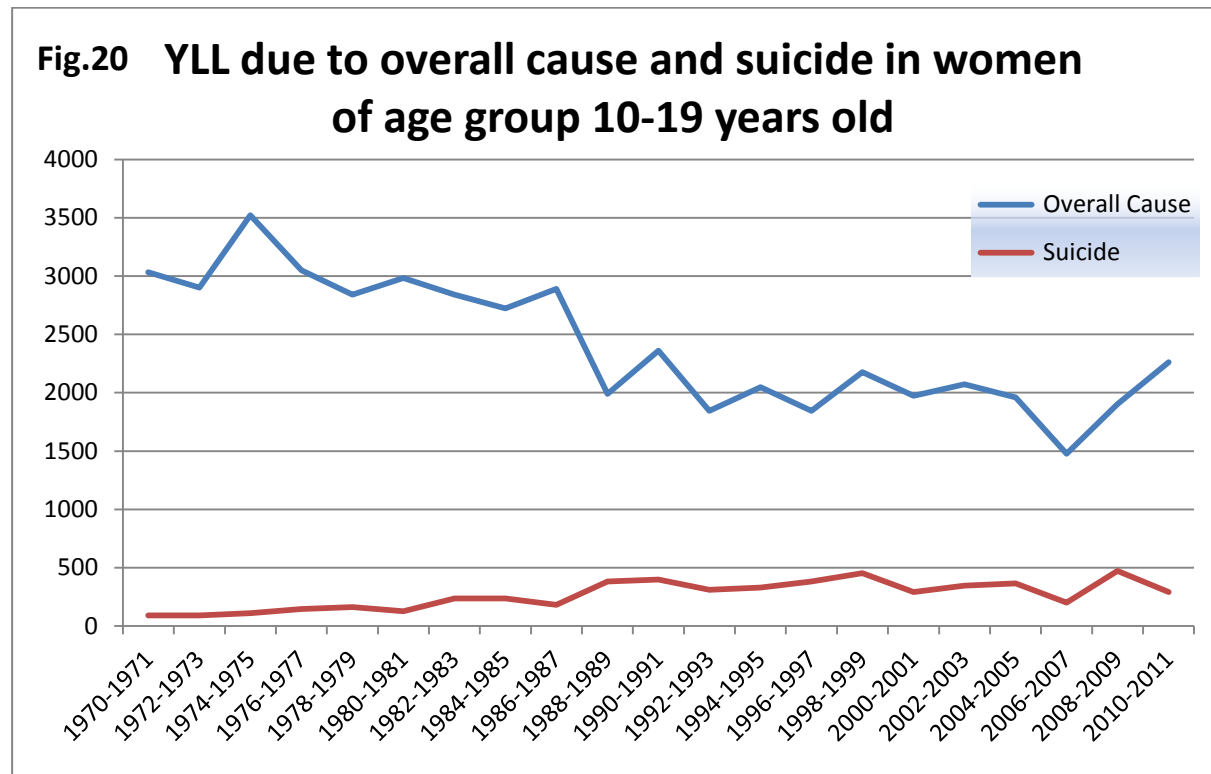


Figure 18 and 19 compares YLL due to overall cause and suicide in men, for both our chosen age groups. In figure 18 we see that the higher boundary for overall cause in men, 10-19 years old, numbers 8724·99 YLL in the year 1972-73. Lower boundary is that of 3303·49 YLL in 2006-07. What we see is a significant decrease throughout the whole time-period. By comparison, higher boundary for YLL due to suicide in same age band numbers 1300·59 years of life lost in 1988-89. Lower boundary is 145·36 in 1970-71, marking a high increase in the two first decades of our time series. In spite of a downward trend in suicide YLL amongst men in later years, this does not reflect the significant drop in YLL due to overall cause. As a result, in the year 2010-11, overall cause numbers 3499·69 YLL, whilst 722·98 for suicide in men, 10-19 years old.

Concerning age group 20-29 (*figure 19*), numbers are not as straightforward. We find higher boundary for overall cause is that of 12200·04 in the year 1986-87. Lower boundary numbers 8300·75 in 2008-09. Although not mirroring the dramatic fall in overall cause YLL amongst 10-19 year olds, it does depict a steady decrease throughout the time period and so bears resemblance to the total overall cause YLL. Where suicide YLL is concerned, the higher boundary for men, age group 20-29, numbers 3467·79 in the year 1988-89. Lower boundary is

found in the year 1970-71, numbering 1087.33 YLL. In spite of a decrease since the peak in late eighties, numbers have kept steady above 2000 YLL, exception be that of the year 2008-09 (1930.40 YLL). Next we will look how this plays out amongst the female population, age specific.



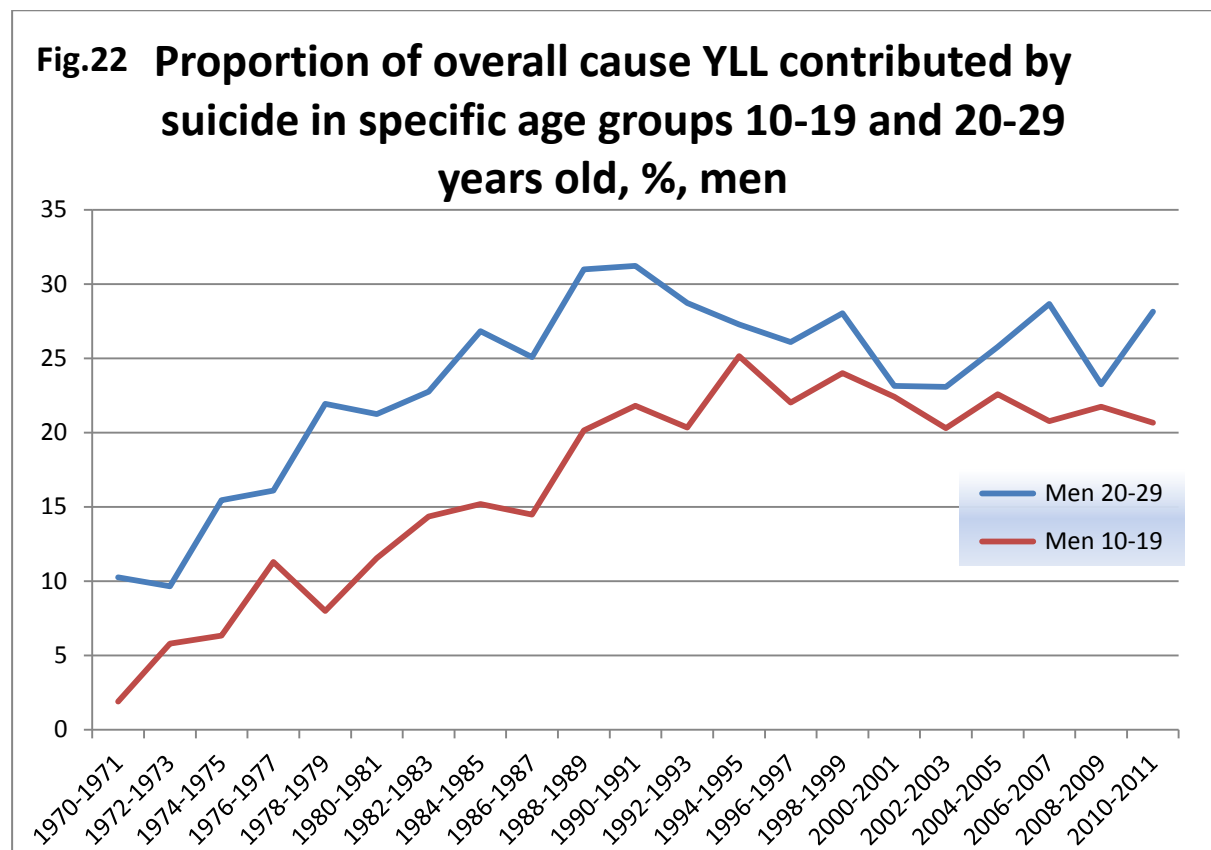
*Figure 20 and 21* compares suicide and overall cause in women, age specific. Absolute numbers are presented. Amongst the 10-19 year olds we find a definite decline in overall cause YLL, while an increase is found regarding suicide YLL. Upper bound for overall cause is 3523·21 YLL in the year 1974-75. Lower bound: 1478·08 YLL in 2006-07. Upper bound for suicide is 472·71 in 2008-09. Lower bound: 90·54 YLL in 1970-71. Similar to what we found amongst males, numbers for age group 10-19 years old seems to be closing in during the time period.

The different trends in overall cause and suicide YLL in women is not as dramatic amongst age group 20-29 years old as seen amongst those aged 10-19 years. This bears resemblance to what found in the two male age groups. Figure 21 shows that higher boundary for overall cause YLL women, aged 20-29 years, is 2137·41 in the year 1978-79. Lower bound: 1410·81 in 1996-97. Picture is that of a decrease, though with fluctuations. As for suicide YLL we have previously suggested that a definite trend is not apparent amongst women, 20-29 years old. Upper bound numbers 942·50 in 1988-89. Lower bound: 437·17 in 1970-71. Regarding the chosen time period it may seem like numbers concerning 20-29 year old women shows an increase the very first years, and after that tend to fluctuate. Nevertheless, opposite to the overall cause YLL, we fail to find a decrease, which would suggest that the relative significance of suicide in said group is magnified in later years.

Now a summation of the findings regarding trends in overall cause and suicide YLL, gender stratified and age specific. Concerning the men we found that the decreasing trend in overall cause YLL was not mirrored in suicide YLL. Although more apparent amongst age group 10-19 years old, this went for the 20-29 year olds as well. To put it short; whilst the decreasing trend in overall cause YLL is consistent throughout the time period, the decreasing trend in suicide YLL following the peak in 1988-89, does not push numbers back to prior levels. As for the female groups similar patterns were found. We should impress that the trend in age group 10-19 years old, both genders, is cause of concern. Although decrease in overall cause YLL is welcome, this bridging of the gap suggests suicide as a relative bigger issue in later years.

To further illustrate we have calculated percentage of overall cause YLL, age specific and gender stratified, in which suicides contributes to. Note that this is *not* the proportion of total overall cause YLL, but for the total amount for said age group, gender stratified.

### 3.3.3 Proportion of overall cause YLL, age group specific and gender stratified

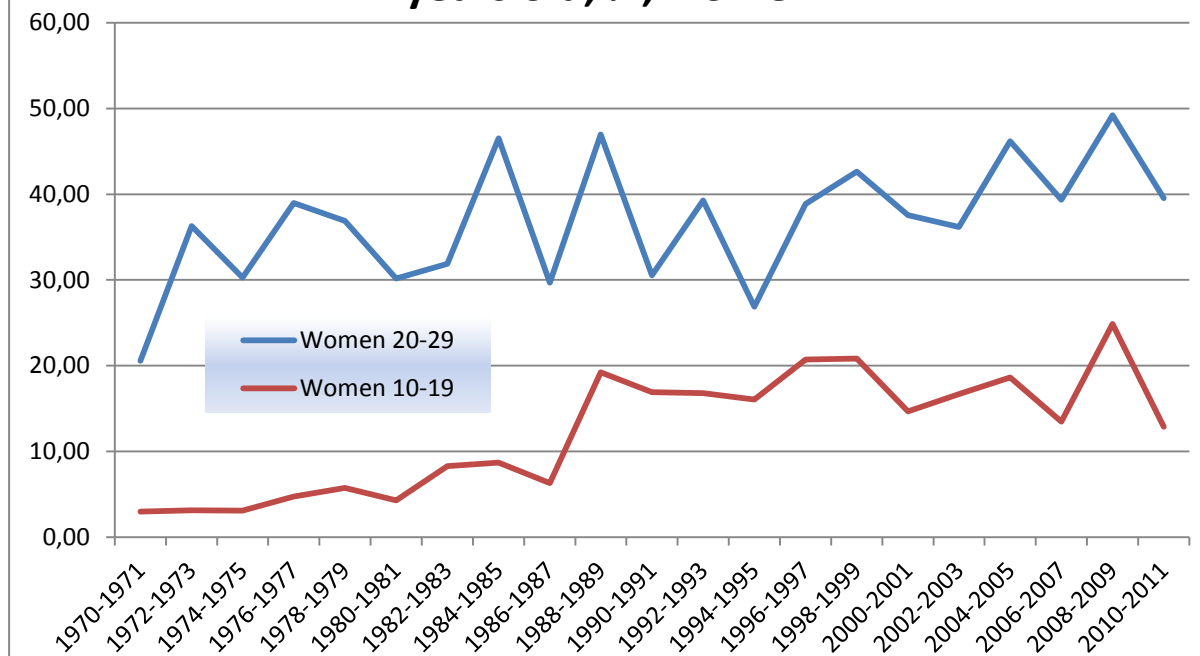


This section extends upon the data from the previous graphs regarding trends in overall cause and suicide YLL. We are moving from absolute to relative numbers, showing proportion of overall cause YLL. Numbers are relating to the amount of YLL within each specific age group, gender stratified. *Figure 22* presents male data, and *figure 23* presents female data.

First men, age group 10-19 years old. Reaching as high as 25.15% of overall cause YLL, and consequently keeping above 20% in later years, gives a somewhat alarming picture for the contribution of suicide to overall cause YLL. The same trend of closing the gap is found amongst the 20-29 years old. Already from the year 1978-79, the percentage of YLL due to overall cause is breaking 20 % (21.94), and it does not fall back. On the contrary it reaches a peak, proportion wise in 1990-91 numbering 31.22%. Although somewhat of a decline the following years, we do not recognize a clear pattern. It may seem like the burden due to suicide deaths in young men, both age groups, is alarmingly high when compared with overall cause in their peers.



**Fig.23 Proportion of overall cause YLL contributed by suicide in specific age groups 10-19 and 20-29 years old, %, women**



We find that suicide YLL in women of 10-19 years old increases proportion wise when compared to overall cause YLL to that of their peers. This picture is relatively consistent over time, although following a quite sudden raise in the late eighties numbers tend to flatten out somewhat later years. Following the year 2000-01, percentages are; 14·68%, 16·69%, 18·61%, 13·48%, 24·86% and 12·89%. As we see there are fluctuations regarding proportion. The sharp fall seen in 2010-11 particularly stands out. It should be noted though that the tragedy at Utøya in the year of 2011 amounted in a big loss of young people. This may explain some of this decline in proportion.

Considering women aged 20-29 years old, we find an increasing trend, although not to the same extent as in age group 10-19 years old. However, suicide makes up for an alarmingly large part when comparing to years of life lost due to overall cause, said age band. Starting out on a 20·56% in 1970-71, the numbers differs between 29·70% in 1986-87 and 49·21% in 2008-09. It should be noted that numbers tend to fluctuate. That aside; the burden of suicide deaths in women aged 20-29 years seems alarmingly high when compared to overall cause in their peers.

Now a summation of the findings regarding proportion of overall cause and suicide YLL, age specific and gender stratified. The significant decrease in YLL due to overall cause, amongst men, both age groups, is not mirrored in YLL due to suicide. This drop, along with an increase in suicide YLL seems to be bridging the gap. This assumption is largely confirmed by a comparison calculating the percentage of overall cause. As for the female groups, increase in proportion is not as dramatic as seen amongst the male groups in the first part of the time period. However, the increase in proportion is relatively steady and does not seem to diminish. This would suggest that the relative significance of suicide in young women, both age groups, seems to increase over time, when compared to overall cause to that of their peers.

To put it short, overall cause YLL has shown a significant decline, suicide YLL has not. The result is that years of life lost due to suicide in the young have shown a remarkable increase in relative significance when compared to overall cause in their peers.

### **3.3.4 Summary**

Although suicide contributed to a minor share of total YLL when compared with overall cause, we found that the relative significance of suicide loss increased during the time period. This was prominent when looking into the two age groups for which our study concerns. We found numbers tended to close in amongst men, bridging the gap between YLL due to suicide and overall cause. The same trend could be found amongst women. We found that an alarmingly high proportion of overall YLL in women aged 20-29 years, were linked to suicide.

These findings imply that the relative significance of suicide, when measuring social, loss has risen throughout the time period. This should cause further efforts to prevent suicide in the young.

## **4 DISCUSSION**

This chapter is divided into four main sections. First we account for the purpose of our study, along with key findings. We then compare our findings with previous studies, as described in the literature review. The third part of the discussion relates to our major concern, namely the social impact of suicide. As a conclusion the last section debates possible implications for policy.

### **4.1 Purpose and key findings of the study**

The purpose of this thesis is measuring the burden to society due to suicide amongst the young in Norway. Our choice of design has been that of time-series data, calculating Years of Life Lost (YLL). Comparison has been made between gender and age. Comparison has also been made to overall cause of death.

Our findings indicates that in spite of the decline in total suicide YLL, as seen in later years, this may not be the case amongst women 10-19, and 20-29 years old. Although men make up for the larger share of suicide YLL, the rise in proportion amongst young women is a concern. As for the relative significance this is illustrated when comparing suicide YLL to that of overall cause of death. Finding an overall decline in years of life lost due to all causes throughout the whole time period, we are faced with what we refer to as a “bridging of the gap”. This meaning that although we may not see a definite increase in suicide YLL, the proportion of years lost due to suicide is subjected to a significant increase, when compared to all causes of death. We found this was the case in all groups. Concerning the matter at hand, this would imply that the relative significance of suicide in the young, when measuring social loss, has risen throughout the time period.

### **4.2 Comparison with literature**

Earlier in the introduction we described what we interpreted as the main findings inside the “years of life lost” catalogue in suicidology. With respect to the paper at hand one could ask whether similarities may be found, or if our study differs from prior research.

As mentioned earlier we failed to find studies solely devoted to years of life lost in the younger population. However, it seems like a number does highlight the issue of premature death amongst the young as a proportionally larger issue than when compared to older age groups (Lukaschek et al., 2012). Still others found an increase in YLL amongst the young (Cryer et al., 1996; Darragh, 1991; Law et al., 2011; Yip, 1996). Now, one could argue that our study does not concern itself with years lost amongst older age groups in the population. In truth no such comparison is made explicitly. What we do see is that the two age groups we are concerned with fail to mirror the declining trend of total suicide YLL. This leads to the assumption that suicide in those age groups is an increasingly larger issue, proportion-wise, when looking at the time period at hand. As for rising trends in absolute numbers, we failed to find a clear pattern following the upsurge in the seventies. What our data do imply is that later years decrease in total suicide YLL mainly is due to trends in the male population, which is reflected also amongst the 10-19 and 20-29 year olds. Numbers amongst women tend to be more stable. Concerning women 10-19 years, we found an increase recent years. This falls in line with previous studies concerning the suicide rate in Norway (Titelman et al., 2013), which as earlier described was one of the reasons to look into burden of suicide in the younger groups in the first place. Whether trends in suicide YLL should be explained by overall suicide rate, suicide rate in young people, or a combination of these two, as Yip (1996) implies, we would argue that said decrease mainly is due to the suicide rate in the male part of the population, to some extent in the young.

Keeping to the gender perspective we may conclude that men in general contribute to a larger share of suicide YLL. This was also the case in most studies reviewed, exception be that of Yip et al. (2008). Interesting to see, one study argued suicide as a proportion-wise bigger issue in women when compared to other injuries (Bose et al., 2006). For our part we find this was the case amongst the women 20-29 years old. Here the proportion of YLL due to all causes, in which could be linked to suicide, was found alarmingly high. It should be noted though that suicide contributed to a large share of overall YLL in the other groups as well.

This brings us to the issue of the relative significance of suicide in terms of burden to society. On one hand one could argue that suicide is a relatively minor issue in the population as a whole when compared to other causes of premature death. On the other hand the share connected to young groups may not be insignificant. As seen in prior studies, downward trends in all cause of mortality do not necessarily reflect that of suicide. Take the 20-29 years

female group as an example. One could argue that when suicide in this particular group fails to mirror the decreasing trend in overall mortality, a larger share of the social burden will inevitably be connected to suicide deaths. By this note we do agree with the literature reviewed that by applying the year of life lost perspective, one may stress the magnitude of suicide when comparing to other causes.

As previously stated, publications may differ in their main subject. We should also be aware that seemingly identical methods do not necessarily generate the same findings. Along with vast differences in terms of demography, economy and living conditions on the different sites one should be careful not to generalize. We are aware that the findings as listed in our review may not be comparable to our population. We do however feel confident that they serve as an illustration of how to identify burden to society by using years of life lost as a proxy measure.

In this section we have looked into existing literature and compared our findings. In what follows we will account for our interpretation of the calculations made, along with implications for the results.

## **4.3 Social impact of Suicide**

Following the increasing trend in suicide mortality from the early seventies, especially in young men, suicide as a public issue has been given more attention the past decades. Efforts, in terms of research and measures of prevention have been applied, first manifested in 1995 by a national strategy for suicide prevention ("Prosjektpplan og handlingsplan mot selvmord 1994-1998," 1995). Although the trend in suicide deaths has been that of a decline since the late eighties, the numbers in later years has been subjected to fluctuations, making a definitely decrease in later years hard to point out. Furthermore, suicide trends in the young may not mirror those of older ages. Safe to say the dire case of suicide in the Norwegian population still remain an important issue. Suicide amounted in 598 deaths for the year 2011, equivalent to 12028·72 YLL. We propose that the YLL offers an opportunity to monitor the social impact of such loss.

### **4.3.1 Relative significance of suicide**

Similar to the suicide rate we find a dramatic increase in years of life lost from the early seventies to the late eighties, reaching from 5973·99 to 14215·01. Annual numbers for the two

past decades are, with two exceptions, keeping consistently over 10,000 years of life lost. This is the numbers of healthy, productive years that society misses out on every year from early death in all ages due to suicide. In comparison we see a steady decline in YLL due to overall cause throughout the whole time-period, starting out on 306,264·57 and ending on 218,753·37 YLL in the year of 2010-11. As we see, the burden due to suicide today is markedly higher than in previous years. The numbers have not adjusted to the levels prior to the upsurge as seen in the seventies. Counting in the significant downward slope in overall causes makes suicide a relatively higher societal problem today than what we have seen in previous years. This is illustrated by an increase in proportion, starting out with 1·95% in 1970-71, reaching 5·20% in 2010-11. This leads us to the matter of social loss due to premature death in the young. Now, we are operating with two different age groups, 10-19 and 20-29 years old, where the picture is somewhat more dramatic.

Considering the increase that was found in regard to proportion of suicide YLL all ages, one could expect similar trends in the younger age groups. However, when comparing suicide and overall cause of death in the chosen age groups separately we find the proportion is remarkably higher. While the 10-19 year old men is starting out with a relatively modest percentage (1·90%) in 1970-71, later years shows a proportion steady above 20% when compared to overall cause to that of their peers. This trend is reflected by the 10-19 year old women, although they do not mirror the magnitude proportion wise. As for the two elder groups the proportion is more alarming. Whilst the lower bound for men numbers 9·66% in 1972-73, it reaches 31·22% in 1990-91, and keeping consistently well above twenty percent the last decade. Concerning the 20-29 year old women we do find an increase proportion wise, although fluctuations make a clear pattern problematic. However, the sheer magnitude is significant. Starting out with lower boundary numbering 20·56% it reaches staggering 49·21% in 2008-09. These results are somewhat in line with previous studies, naming suicide as a greater proportion of overall causes in the young and in women (Bose et al., 2006; Lukaschek et al., 2012).

Interpreting these results we need to keep in mind that the raise in proportion, as previously stated, is to a large extent due to a definite decrease in overall cause of death. One could argue that as society progresses in terms of living standards and public health care, along with developing cures and effective treatment for known diseases and conditions, violent deaths will naturally cause a bigger share of mortality in a population. Indeed, mortality has been

declining ever since the nineteenth century, and more so amongst the young due to the near eradication of infectious diseases. In contrast, violent deaths, referring to accidents, suicide and homicide, has been more stable in modern time. Although the nature of accidents has been subjected to considerable changes as time has passed, the share of deaths connected to them has not. It should be noted a slight decrease in violent deaths amongst men, and an increase amongst women. This is partially explained by the transition from work related accidents (e.g. fishing and shipping) to traffic accidents and transport (Pedersen, 2007a, 2007b). Apart from answering for the larger share of social burden induced by suicide deaths amongst the young today, this also brings up the question whether further efforts in preventing suicide deaths would be in vain. Surely from a cost efficient perspective one could be tempted to conclude that violent deaths are an undeniable fact of human life, and that efforts therefore should be located elsewhere for maximization of limited resources. We are not to debate against a laissez-faire attitude in the health sector here. We do however object that the application of such logic would imply a society where efforts would be located solely on the basis of what is deemed gainful in the present, undermining future benefits. Furthermore, there is evidence that government action in preventing violent deaths has shown results in later years (Pedersen, 2007a). On a happier note, studies show that both the general public, health care personnel and politicians view suicide as preventable (Hjelmeland, 2010; Hjelmeland & Knizek, 2004). Taking into account obligations by the Norwegian government, as previously mentioned, we feel confident that the whether or not to prioritize suicide prevention is a non-issue.

### **4.3.2 Social loss**

In the previous section we stated that suicide seems to bear a disproportionately large share of social loss due to premature death in the young. A question that arises is what this social loss amounts in, what is the social impact? The most obvious answer is the large number of years in which people can contribute that society misses out on. In 2011 8655·23 years of life years were lost in men, all ages. Age group 10-19 accounted for 724·26 of these, while 2289·84 YLL were attributable to the 20-29 years old. Years of life lost amongst women amounted in 3373·49, where the 10-19 year olds stood for 438·37 and the 20-29 contributed to 720·10 YLL. By these calculations 4172·57 years of life were lost in one single year due to suicide in the young, approximately a third of the total suicide YLL for that year. Now, keeping in mind the distinction between personal problems and public issues (Mills, 1959/2000) these losses

are likely to affect society on a number of levels. Firstly, what is referred to as direct costs in economic analysis would be that of increased stress on emergency personnel and services, possible hospitalization and life-prolonging measures. In addition, cost of funeral and police investigation could be put in this category. In the more fortunate situations where the suicide act proves non-fatal, physical and psychological rehabilitation would be required for a longer period of time (O'Sullivan, Lawlor, Corcoran, & Kelleher, 1999). Regarding years of life lost, the indirect costs may be more relevant, and addresses the long term effects. As a result of premature death, people who could otherwise contribute to society are now gone. We mentioned earlier in the description of the original PYLL design that some studies have been more interested in measuring working years as opposed to life years. This is on the basis that a lot of resources have been channeled into each individual citizen of a given population, through institutions such as family, kindergarten, school and higher education, health- and other public services. Bluntly speaking; by the design of our society an investment is placed, and in given time this investment is expected to pay off.

Now, concerning the younger group of the population, they soon will be starting or have just started to fulfill this investment. As a consequence the unfortunate death of a person in his or her younger years would likely have a major impact on society. The loss of working years does not cover the overall picture of the social burden due to premature death. We can safely assume that a person's contribution to society does not stop at his or her job-description. Other factors would include that of a family provider and caretaker, present or future responsibilities for older generations. In addition volunteer positions and responsibilities in the local community should be taken into account. As discussed earlier one could argue that the social impact of losing a caretaker would vary depending on the social safety net available. It should be noted that the DALY approach applied in the General Burden of Disease studies have emphasized the social loss of providing family members in developing countries, where the end results is nothing short but devastating. Although the social safety net in Norway provides education for its citizens regardless of social status, we do argue that the loss of a caretaker would likely cause significant burden in terms of social loss. We are not to dwell on the personal perspective here. Obvious it may seem it should be noted though that the personal consequences for family and friends of the deceased, in terms of grief, hardship, possible stigma and culture specific attitudes towards suicide, would likely have severe repercussions concerning physical and mental health along with general sense of well-being. Although hard to measure, it is likely to have a great impact on the social loss. McDaid



& Kennelly (2009) refer to this as intangible costs. Even though the YLL measure does not take into account all these aspects, it illustrates that the impact of premature death does not end at the funeral. Where our population is concerned we are looking at 4172.57 years of life lost in 2011 due to suicide in the young. This is years lost as an employee, providing caretaker, family member and resource to the society, all lost in a single year.

It may seem like suicide in the young has a profound impact on society on several levels. Though the YLL serves as a proxy measure, it gives an idea of the magnitude of social loss. Looking at the available literature concerning suicide YLL, as earlier described, we found that most publications did not provide estimations of the total cost due to years of life lost. The exception was that of Law et al. (2011), concerning numbers from Taiwan. Adding an additional measure, the present value of lifetime earnings (PVLE), suicide was associated with an estimated 32.5 billion New Taiwan Dollars (NTD) of lost earnings for the year 2007. Other studies underpin the impact of economic loss. Estimated costs for the population in New Zealand, both suicide (n = 460) and attempted suicide (n = 5095) in the year 2002 was approximately \$1.4 billion (NZD)(O'Dea & Tucker, 2005). Potential loss of future earnings were in America, for the year 2002, estimated to be that of 13 billion US dollars, due to overall suicide deaths (Knox & Caine, 2005). Estimated total cost in Ireland for the year 2001 was over 906 million Euros, equivalent to near 1 per cent of the gross national product at the time (Kennelly, 2007).

It should be noted that the concept of estimating suicide costs has been subjected to debate. Yang & Lester (2007) argue that the actual burden, in terms of economic loss due to medical costs and loss of earnings, may be exaggerated. They uphold humane considerations as the most important reason for prevention. However, as mentioned earlier lost output alone falls short in describing the actual burden induced by suicide. Concerning the study from New Zealand (O'Dea & Tucker, 2005), intangible costs was listed as the main contributor to economic loss due to suicide. We do not have any estimation regarding the Norwegian population. Based on the knowledge of education and payday level keeping up with the standards found in comparable populations, one could assume that the economic loss due to suicide is substantial. Seeing that our study uses YLL as a proxy, we must emphasize that it fails in describing the actual economic losses connected to premature death. From a socioeconomic view, this suggests further economic analysis of the burden induced by suicide

deaths. Still, the numbers as stated above are most striking, and may very well serve as an argument for further efforts in the health sector.

## 4.4 Implications for policy

Our study has looked into development of YLL the last three decades. Our data indicates suicide in the young as a significant contributor to overall burden to society. However, we must impress the limitations of our findings. For one thing, the choice of two age groups, each divided into a ten year band, do not highlight internal differences concerning specific age and related tendency in suicide YLL. We may also assume that the challenges in suicide prevention will differ according to whether efforts are focused on the very young, in adolescents, or young adults. One could argue alternative age groups, 10-14., 25-29, or discard the youngest age group altogether. When our study falls short to identify these internal differences, this limits our findings. Still, looking at different studies from our review, we fail to find a consequent use of age groups. Were our study is concerned; our purpose is not first and foremost to see how years of life lost plays out in different ages. Our purpose is measuring the burden to society due to suicide in the young, in terms of life years lost. Having highlighted this important societal issue, we would refer to other studies better describing the “who, how and why” of suicide in young people.

As for using the years of life lost measure as a mean to effect politics and consequently suicide prevention programs, we are aware that this is not without controversies. In the process of valuing a person's life on the basis of his or her future stream of healthy life years, and additionally assigning value to years by age, one could question whether it is more important to save the life of a young person than that of an older adult. Such logic, taken to its extreme, would cause a shift in prevention programs, directing all resources to population sub-groups where future payoff is deemed most likely. Safe to say the inclination to disfavor years of life lost amongst the elderly is a much debated issue (Gunnell & Middleton, 2003; Yip et al., 2005). Suicide in the elderly is a most important issue on a global scale (O'Connell, Chin, Cunningham, & Lawlor, 2004). In Norway a high proportion of all suicides are found in those aged 45 or older, 52 % for the year 2012. The same year suicide in those aged 65 years and more amounted in 78 of the total 515 deaths (Statistisk Sentralbyrå, 2013). Surely important work remains for targeting these groups (Kjølseth, 2006).

One could object then that the task of measuring social burden due to suicide in the young serves no real purpose. A fair question to ask is whether it is acceptable to put a price on the lives lost in tragic circumstances, and if so, should this be regarded significant for future research, prevention programs, clinical and social work? As this study has illustrated there may not be any easy answer to this. From a strictly personal perspective the burden associated with premature death should not serve as an argument for present and future efforts. This meaning that in everyday life of social work and clinical intervention we are facing individuals as opposed to numbers. The expression “end in itself”, as previously mentioned, would then imply indifference to characteristics such as age, gender, and potential future output. Regarding the issue of suicide in the elderly one could then argue that the year of life lost perspective fails on inequity grounds, insofar that it gives more weight to life years lost by younger age groups. However, from a societal perspective the measuring of such burden may not be insignificant. Knowing that the economic argument provides guidelines where public policy is concerned, health sector included, the years of life lost approach may help advocate the need for further efforts. As for answering the question concerning which groups resources should be located, in the young or the elderly, we answer both. Our purpose of measuring years of life lost is offering an alternative perspective for premature death, not simply replace the traditional way to estimate mortality. We would encourage policy makers to take both perspectives into account, ensuring a clearer picture of the matter at hand.

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